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SECULAR VARIATIONS OF THE ATMOSPHERIC CIRCULATION SINCE 1750

BY

H. H. LAMB, M.A. and A. I. JOHNSON, B.Sc.

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SECULAR VARIATIONS OF THE ATMOSPHERIC CIRCULATION SINCE 1750

INTRODUCTION

Studies of charts showing mean values of various meteorological elements have demonstrated that those charts which directly portray the atmospheric circulation are most fundamental. Anomalous features of other aspects of the weather, such as the temperature distribution prevailing, may generally be understood in terms of anomalies of the circulation itself. Alternatively any abnormality in the atmospheric circulation usually produces some degree of anomaly in the distribution of other elements during the same period. So in climatology, as in synoptic meteorology, representation of the atmospheric circulation affords a unified view of many aspects of atmospheric behaviour.

Monthly mean pressure charts have long been the main tool used in considering the normal seasonal changes of the general circulation. There is no special virtue in the choice of a month as the basic time unit, save that the data must be grouped in some way to reduce bulk if long series are to be dealt with and comprehended. Amongst the longest records, moreover, far more data are available for the calendar months than for any other unit of time. Although important variations go on over periods of less than a month, it has proved possible to learn much about the normal seasonal developments from monthly charts and it should be possible to use similar charts with some success for the study of secular changes.

The main currents of the atmospheric circulation are seen more clearly and simply in the upper air, but upper air observations sufficient for regular mapping have so far been available for far too short a time for the study of long-period changes of circulation pattern. Secular changes in the winds observed at mountain stations in Europe since 1880 (Flohn[1]*) leave no doubt that valuable insight into climatic variations could be gained in this way if more observations were available. However, the circulation of the atmosphere at the surface is related to that in the upper air, and useful deductions about the prevailing upper wind pattern may be made from surface charts such as those here presented (Lamb and Johnson[2,3]; Lamb[4]). Series of charts of monthly mean pressure at MSL, covering as long a period of years as possible are therefore likely to be of value in studies of climatic changes and the longer-term variations of the atmospheric circulation. The charts should also serve as reference material both for long-range weather forecasting and investigations of the possible effects upon the atmosphere of any known environmental circumstances, such as the presence in particular years of abnormal sea temperatures or ice cover or of volcanic dust palls.

Reconstruction of the circulation patterns over as much of the world as the availability of data permits for individual months back over 200 years involved the use of many data sources. It was necessary to start with just one or two sample months of the year. January was chosen because it marks the maximum strength of the circulation over the northern hemisphere. In the southern hemisphere January is the month usually chosen to typify the circulation at the height

* The index figures refer to the bibliography on pp. 17–22.

of summer. July represents the climax of development of the northern hemisphere summer circulation with the Eurasian monsoon pattern at its strongest, whilst this month typifies mid-winter in the southern hemisphere.

It would be desirable to carry out similar studies on other months, particularly May when the circulation is weakest over much of the northern hemisphere and blocking patterns are common both in the North Atlantic–Greenland and South Atlantic–Chile regions. September deserves attention as the month when the always strong southern hemisphere circulation attains its greatest strength. Work on additional months is, however, likely to take several years to complete. In the meantime, the results for January and July here published may be put to use.

For an analysis of the trends revealed by these long series of January and July charts and how they appear to fit into the pattern of changes over a still longer period of time, together with some discussion of probable causative influences at work, reference should be made to the scientific papers by the present authors quoted in the bibliography, section (*a*).

The charts cover as much of the world as possible for each January (Figure 2) and each July (Figure 5) since 1750. There are also sets of 10-year mean charts for each decade from the 1750's to the 1950's (Figures 3 and 6) and 40-year mean charts (Figures 4 and 7) for selected periods. The longer-period charts cover a larger area than is possible for the individual months, the limits being decided by a predetermined maximum permissible error margin, as explained hereinafter. The Tables give the values for each January and July of a number of simple indices which specify the position and intensity of various features of the mean circulation. These indices have all been derived from the charts reproduced here.

§ 1—SOURCES OF DATA

Section (*b*) of the bibliography lists the sources of pressure and wind data consulted and a limited selection of sources of long series of temperature and rainfall figures, etc. As published, the data are in various states of readiness for use. In making use of the pressure values care has to be exercised to discover whether temperature and gravity corrections or reduction to sea level remain to be applied. In a number of cases in Europe where the height of the barometer above sea level was not known, this was deduced from the annual mean pressure distribution established with the aid of other stations forming a network surrounding the place in question.

The order of presentation of the works listed in the bibliography is as follows:

1. Group sources, pressure data.
   - (i) Those giving world coverage
   - (ii) Those with some approach to world coverage
   - (iii) Those with only regional coverage
     - Europe
     - Asia
     - Africa
     - North America
     - South America
     - Australasia
     - Arctic
     - Antarctic
     - Islands

2. Sources used for single stations, pressure data.
3. Group sources, wind data.
4. Sources of wind data at single stations.
5. Sources of long series of temperature values.
6. Sources of long series of rainfall figures.
7. Miscellaneous weather data.

The order of presentation under each heading is alphabetical order of names and chronological order of periods covered. A † sign against any place in the pressure data list means that the same work gave wind information also. Readers wishing to use this bibliography to trace data of a similar, but not identical, nature may find it worthwhile to make a search through other volumes of the various early publication series named.

Temperature, rainfall and other weather data from sources too numerous to list in full were taken into account in analysing the maps. All types of relevant information, the sources of which happened to be known and available in the Meteorological Office Library, were used—including, for instance, the reports of Moravian mission stations in Labrador from just before 1800, expeditions in the Arctic from the Greenland cruises of Scoresby soon after 1800 and the exploration of the Canadian Arctic in 1820–60, expeditions in the Antarctic mainly from about 1900, and the state of the ice off Greenland and Iceland from long before 1750 (Koch[5]).

Numerous weather diaries from the eighteenth century onwards were also traced and consulted, with the kind co-operation of Mr. R. Cranna, Superintendent of the Meteorological Office, Edinburgh, and the Librarians of the following bodies:

American Academy of Arts and Sciences,
280 Newton Street, Boston, Mass.
American Meteorological Society,
Joy Street, Boston, Mass.
American Philosophical Society,
127 South Fifth Street, Philadelphia 6, Pa.
Harvard College,
Cambridge, Mass.
Library of Congress (Manuscript Division),
Washington 25, D.C.
Royal Meteorological Society,
49 Cromwell Road, London, S.W.7.

Since this work was done three valuable bibliographies of long series of observations have been made available and should be consulted in any further studies (Havens[6], World Meteorological Organization[7], Mitchell[8]).

§ 2—ANCIENT UNITS

Many of the pressure, temperature and rainfall figures in the works listed in the bibliography are published in a miscellany of ancient units. The same applies to heights above sea level. The difficulty of conversions to a single scale is a convincing testimony to the advantage of universal units. Clearly, the task of conversion should not stop short of the units which are now approaching universal use—i.e. the metric system and Celsius temperatures.

Since it has by now become difficult to find precise information about some of the obsolete units, details essential to the present purpose are given in Appendix I. Inches were either 10 or (more usually) 12 to the foot, and the length of the foot varied from country to country. Before the adoption of metric units, Paris inches were increasingly used over much of Europe for meteorological measurements, although English inches also had a rather wide currency. Paris inches were divided into 12 'lines', and each line was sometimes divided into twelfths. According to the prevailing notation a measurement of two (Paris) feet three and a half inches would be written 2′ 3″ 6‴.

After the end of the Napoleonic era, the metric system (which had been associated with Napoleon) was abandoned in some countries that had adopted it. Thus, even Norway began to use Paris inches and lines and continued using these in some printed meteorological registers until about 1870.

Pressures were commonly given as heights of the mercury column in lines alone. Thus 1000 millibars (= 332·52 Paris lines) would be printed as 332·52‴. Sometimes the figures after the point (though not in the example given) represented twelfths of a line: this could be discovered by inspection of a table if the figures after the point never exceeded 11.

Longitudes were measured east and west of various places other than Greenwich, but these places can usually still be identified in atlases and the appropriate conversions read off as the longitude of each of the places, measured from Greenwich.

Conversion tables used for the most commonly occurring ancient units no longer readily found are printed here as Appendix I with some further necessary notes about early temperature measurements. These tables convert pressure values obtained as heights of the mercury column in Paris lines directly into millibars, and temperatures on various early temperature scales into degrees Celsius.

Users of tables of ancient wind direction observations where the Latin language is used should be aware of the following abbreviations.

S. (for *Septentrionalis*)	= Northerly (or Northern)
S. Or.	= North-East
Or. (for *Orientalis*)	= Easterly (or Eastern)
M. Or. or Mer. Or.	= South-East
M. or Mer. (for *Meridionalis*)	= Southerly (or Southern)
M. Occ. or Mer. Occ.	= South-West
Occ. (for *Occidentalis*)	= Westerly (or Western)
S. Occ.	= North-West.

§ 3—CONSTRUCTION OF THE CHARTS

Several of the published long series of pressure observations had already been reduced to a standard datum. Examples from different parts of the world of series which could be used from an early date to the present time with little supplementary effort were:

Trondheim 1762–
Paris 1764–
Edinburgh 1769–
Various places with shorter, but overlapping periods of record near Boston, Mass. 1786–
London 1787–
St. Petersburg/Leningrad 1822–
Gibraltar 1822–
Warsaw, Krakow, Ekaterinburg/Sverdlovsk and Barnaul 1836–
Toronto 1840–
Hobart 1841–
Madras 1841–
Cape Town 1842–
Stykkisholm (Iceland) 1846–
Rio de Janeiro 1851–
Mauritius 1853–
Auckland (New Zealand) 1854–
Adelaide (S. Australia) 1857–
Santiago de Chile 1861–
Trinidad 1862–
Ponta Delgada (Azores) 1865–

With rather more trouble, owing to much greater height above sea level, it was possible to use various Swiss stations' records from 1755 onwards. Notable extensions into high northern and southern latitudes begin with Spitsbergen (78° N) 1912–; Laurie Island (South Orkneys) (61°S) 1903–.

These stations provided a basis of reference against which the quality of, and corrections to be applied to, other long records for the earlier years could be established. Examples of valuable earlier records which it was found possible to use are:

London 1723–64, 1774–81
Berlin 1729–70
Zwanenburg (Holland) 1743–1808
St. Petersburg/Leningrad 1763–83
Salem, Mass. 1786–1820
Harvard 1790–1812, 1840–88
Palermo 1791–1856
Udine 1803–42
Archangel 1813–31
New Bedford, Mass. 1813–50
Boston, Mass. 1826–29
Providence, Rhode Island 1831–60
Irkutsk 1836–44
Peking 1841–55
Nikolaevsk on Amur 1855–85.

This provided a framework of values in many parts of the world, which could be accepted as reliable. Upon this framework one can build further, since it is possible to recognize as reliable some of the fragmentary records which cover a few years or a few decades in different places,

thus filling in detail on the maps. Over part of Europe back to the 1790's the network of available pressure observations is closer than can be effectively used for mapping. This redundancy was however useful in establishing the reliability of those stations which gave mutually consistent values. It also established that the best barometers of the late eighteenth century were quite capable of yielding consistent MSL pressures when in the hands of a sound observer. This meant that it might be considered admissible to accept certain observations from isolated positions important for the extension of the maps, simply on the evidence of a well-kept record presented with an awareness of the requirements of sound observing and possible corrections for instrument error etc.

Examples of shorter-period observation records used on these grounds were:

Lyndon, Rutland (England) 1771–75
Stations in Europe and overseas organized by the Societas Meteorologica Palatina 1781–92
Madeira 1793–1802
Reykjavik 1823–37
Christiansborg/Accra 1829–34
Upernivik (West Greenland) 1833–38
St. John's, Newfoundland 1834–44, 1852–70
São Miguel, Azores 1840's (odd years and decade mean)
St. Helena 1841–45
Godthaab (Greenland) 1841–46
Jakobshavn 1842–51
Sitka, Alaska 1843–57
Many United States stations 1854–59
Southern Chilean stations 1855–
Falkland Islands 1859–68, 1875–77
Observations from various expedition ships.

In latitudes where diurnal variation of pressure might be important, the values taken were either averages of several observation hours or for a particular hour chosen to avoid as far as possible the times of local diurnal maxima and minima.

§ 4—LIMITS OF THE CHART ANALYSIS

The isobars were all drawn by the same analyst. The charts for each January and each July were first drawn over the widest area for which implications about the circulation could be derived from the available observations. Tests were carried out as described under (*a*) and (*b*) below to discover and map the magnitude of the random errors occurring as well as any bias shown by the analyst. The resulting geographical limits of reliable analysis are reproduced here on the maps (Figure 1) which indicate the network of pressure observations each decade by the situation at the beginning of the decade in 1750, 1760 and so on.

(*a*) *January*

Charts for twenty-one recent Januarys were first analysed using a network of observations similar to that available during the period 1786 to 1820. Next this was repeated with the same 21 Januarys and a network comparable with that for the years 1821 to 1835. Only when these two sets of maps had been completed was an analysis made using all data available for the 21 years in question. Comparison of Januarys of the final set with the previous analyses of the same January provided a measure of the random errors on individual charts, and by comparing the distribution of average pressure values produced by each of the three sets of charts an indication of the systematic errors or bias was obtained.

The tests revealed that there had been a certain amount of bias in fringe areas in the construction of the early maps. The regions concerned were Labrador–Quebec, around Jan Mayen and in European Russia. Pressures in these regions were consistently a few millibars too low on the maps simulating the years 1786 to 1820. Elsewhere there were no indications of bias greater than one millibar and the average pressures obtained from the test charts were in good agreement with those used for the verification.

Random errors were studied as follows. The standard errors, σ, were computed at a network of gridpoints from the expression

$$\sigma = \sqrt{\frac{\Sigma x^2}{n-1}}$$

where σ is the standard error, x stands for the error on each of the individual January maps and n for the number of values available for test, in this case 21. Isopleth maps were drawn showing the distribution of σ over the test area, Europe, the North Atlantic and eastern North America. It was decided that analysis of the pressure maps should be accepted only over regions where the standard error was less than $\pm$ 2·5 mb. Because of differences in the actual variability of monthly mean pressure over different parts of the world, it might be thought that the limit of tolerable error should be varied. However, it was considered important to keep the procedure as simple as possible if the maps were to be intelligible, and for January, at least, the adoption of a 2·5 mb standard error as the limit was regarded as a satisfactory compromise for the whole world.

Isopleths corresponding to a standard error of $\pm$ 2·5 mb were used as limits for the pressure maps in the period of the tests, (1786–1820 and 1821–35). For years not included in either of these periods, equivalent limits were estimated. The estimates were based on the findings of the tests, which had given a good indication of the separation of the outer edge of the observation network and the 2·5 mb standard error-isopleth. Similarly, estimates were made of limits in parts of the world that were not included in the tests because pressure records did not begin until after 1835. It was unfortunate that no comparable tests of error liability could be made in the southern hemisphere, but even in the 1950's the density of observing stations in the vast southern ocean areas was too low for any tests to be made with confidence that the final analysis would be altogether sound. Limits were therefore drawn utilizing the knowledge gained from the northern hemisphere tests and what is known of the variability of monthly mean pressure in different parts of the southern hemisphere.

When n observations, each having a standard error of σ are averaged together, the standard error of the mean, σ_m, is given by

$$\sigma_m = \frac{\sigma}{\sqrt{n}}.$$

Thus charts representing the mean of n successive Januarys may, with the same criterion for delimitation, be drawn over a wider area than charts for individual Januarys. Largely for this reason, charts of decade mean pressure (Figures 3 and 6) were produced for every decade from the 1750's to the 1950's. Limits were defined as $\sigma_m = \pm 2{\cdot}5$ mb for the decade mean. Precisely the same procedure was used to delimit some 40-year mean charts of special interest (Figures 4 and 7). The period of forty years was chosen because it was found to be just long enough to reduce the random errors over the whole width of the North Atlantic Ocean below the stipulated tolerance limit of standard error $\pm$ 2·5 mb back to the time around 1800 when the circulation and the winter climate both appeared materially different from the modern (early twentieth century) normal. Moreover, it happens that the best available maps of the modern normal pressure distribution are also based on a forty-year period, 1900–39 (Berlin[9]).

(*b*) *July*

The incidence of systematic errors (analyst's bias) and random errors was examined, just as for January, by test charts prepared for recent years with skeleton data as for 1786–1820 and 1821–35. A certain amount of bias was again found in the fringe areas not far beyond the limit of the area covered by observations. Analyst's bias also amounted to slightly over one millibar in mid-Atlantic north of 45°N and near Bermuda. In relation to the weaker pressure gradients prevailing in July than in January, it was deemed advisable to correct the analysis of the entire chart series for this small bias and repeat the tests. Residual bias (error of the mean of the test series) after this correction was found to be only a small fraction of a millibar.

Random errors were less than in January, no doubt because of the weaker pressure gradients and smaller variance of monthly mean pressure over the northern hemisphere in summer. (There is no parallel to this in the southern hemisphere summer.) It was considered that the maximum permissible value of the standard error in July in the northern hemisphere should be ± 1 mb, as against $\pm 2{\cdot}5$ mb in January. This means that the ratio of tolerated random errors in January to those in July is about the same as the ratio of standard deviations of monthly mean pressure in the two months.

In the southern hemisphere there is no reason to suppose any important change in the random error magnitudes between January and July, though there was no possibility of performing satisfactory tests on the southern hemisphere part of the maps, for the same reason as in January. In both months a maximum allowable standard error of $\pm 2{\cdot}5$ mb has been aimed at in drawing the limit of the published analyses in the southern hemisphere, and this line has been drawn by reference to the results of the tests performed over the North Atlantic.

The convention adopted on the charts printed in this volume is that isobars are shown as full lines at 5-mb intervals over all those areas where the standard error is estimated as $\leqslant \pm 2{\cdot}5$ mb ($\pm 1{\cdot}0$ mb in the northern hemisphere in July). Broken lines are printed where the general pattern can be indicated with confidence, although the isobars are not sufficiently accurate for any kind of measurements to be based upon them.

The technique used to establish the limits adopted could not specify completely the errors to which the charts are subject in every part of the world and in all the 200 and more years studied. The tests do probably represent the nearest possible approach to an objective criterion for limiting the area mapped. They probably also mean that all imaginary or misconceived features, which may have entered the analysis of the original charts in the fringe areas, have been eliminated from the areas here printed. There must however be the usual errors due to smoothing. Wherever the real pressure distribution is intricate and the isobars sinuous, the isobars on any small-scale map are always too smooth. Effectively the error tests performed were such as to measure the departures from the best set of smoothed isobars. Workers concerned with detail, especially in parts of the world remote from the North Atlantic, may find it profitable to construct corresponding larger-scale maps of their own areas from data, not all of which were at the present authors' disposal. Nevertheless the charts here printed probably pay more attention to local or regional detail, and are based on fuller data, than any comparable series so far produced.

§ 5—CIRCULATION INDICES

It is convenient to be able to specify the main features of each pressure map by simple numerical indices. Two types of index are given in the Tables printed in this report:

(1) *Indices of intensity.*—These relate to the strength of the main atmospheric currents rather than to the intensity of the semi-permanent high- and low-pressure regions. The latter can in any case be read off the maps without difficulty. The values here tabulated are differences of mean pressure between two fixed points. For a reliable index, these pressure differences across the windstream

should be measured where the windstream is best developed and between two points that are nearly always within it. The first of these requirements usually means that, if it is reasonable to do so, the measurement should be made over the ocean, where moreover the surface windstreams are free of distortions due to topographical influences. It is over the ocean that most of the main windstreams in the lower atmosphere are found.

A few of the intensity indices tabulated are over-all differences between the highest and lowest monthly mean pressures over the sector concerned. For instance, the pressure difference between the maximum near the Azores and the minimum near Iceland has been used as an alternative index of the strength of the temperate zone westerlies over the North Atlantic in January. Study of correlation coefficients between this and the various other possible measures of the westerlies over the North Atlantic suggests that this over-all pressure range is one of the best indices of the North Atlantic westerlies in most months of the year, though not in those summer months (such as July) when an arbitrary choice would have to be made between the lowest monthly mean pressures in regions near Labrador, Iceland and northern Europe. Similarly the over-all range of monthly mean pressure in January between the maximum over Asia and the minimum over the Atlantic (both taken at 55°N) appears to be one of the best meridional indices.

Zonal and meridional indices measured near the British Isles–North Sea area are related to the nearest corresponding indices over the Atlantic Ocean by statistically significant correlation coefficients, though the numerical values of these coefficients seldom exceed +0·5. These north-west European indices are useful, however, because they provide the longest reliable series of values.

(2) *Indices of position.*—The position indices specify the latitude of semi-permanent features of the large-scale atmospheric circulation, such as the sub-polar pressure minimum and the sub-tropical maximum in various sectors, by means of the average latitude taken over an appropriate range of longitudes in which the feature is identifiable without ambiguity. For instance, the latitude of the sub-polar low pressure region in the North Atlantic sector commonly referred to as the 'Iceland low' has been taken as the latitude of the trough line averaged over longitudes 40, 30, 20 and 10°W.

One or two indices of the longitudinal position of key features of the circulation in the most reliable parts of the maps over the North Atlantic have also been tabulated. The measure here presented of the longitudinal position of troughs in the southern hemisphere westerlies (i.e. in the 'Roaring Forties', in July) is given by a diagram (Figure 8), since in this case it is not easy to specify a single longitude figure which could be tabulated.

As these indices imply, it is important when discussing any circulation anomaly to distinguish between that part which is due to a change of strength of the circulation, and that which represents a change of position.

The earliest year for which a particular index can be given is, of course, determined by the first year for which the chart analysis can be extended to the area concerned, which in turn depends on the size of the random errors. In the Tables, index values are given for individual months when they are measured within the stipulated area for individual months ($\sigma < 2{\cdot}5$ mb). If for an earlier period an index falls within the prescribed area for 10-year mean charts ($\sigma_m < 2{\cdot}5$ mb), then running 10-year means are given; for still earlier years* only 40-year or longer-period mean values should be used. From tests applied it is believed that the intensity indices tabulated are subject to standard errors nowhere exceeding about three per cent of the values printed.

* In these cases 10-year mean values in the Tables are given in italics.

The number of indices, particularly of circulation strength, which could be defined is large. Those selected for tabulation are thought to be some of the most reliable and meaningful. The best indices found in these studies of long-term variations of the atmospheric circulation appear to have the following properties:

(i) They have generally higher correlation coefficients with other measures of the same airstream than the latter have with each other.

(ii) They reveal a considerable similarity in the main trend of circulation strength in different parts of the world (though the date of general maximum circulation strength in the early part of the present century appears to vary by at least 20 years according to the index examined).

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APPENDIX I—EQUIVALENT MEASURES OF LENGTH

1 Austrian Foot (Fuss)	= 31·611 cm = 12 Zoll
1 Baden Foot or Swiss Foot	= 30·00 cm = 10 Zoll
1 Bavarian Foot	= 29·186 cm = 12 Zoll
1 Brunswick Foot	= 28·536 cm = 12 Zoll
1 Hannover Foot	= 29·209 cm = 12 Zoll
1 Hessischer Fuss	= 25·00 cm = 10 Zoll
1 Kurhessischer Fuss	= 28·770 cm = 12 Zoll
1 Rhineland Foot	= 31·385 cm = 12 Zoll
1 Sächsischer Fuss	= 28·319 cm = 12 Zoll
1 Württemberg Foot	= 28·649 cm = 10 Zoll
1 Danish Foot (Fod/Fot)	= 31·4 cm = 12 Tommer
1 English Foot	= 30·48 cm = 12 Inches
1 Paris Foot	= 32·48 cm = 12 Paris Inches
	= 144 Paris Lines
	(1 Toise = 6 Paris Feet)
1 Russian Foot	= 30·5 cm = 12 Inches
1 Swedish Foot	= 29·7 cm = 12 Tum
	= 144 Linier

The above Swedish units came to be regarded as old-fashioned (called Verkmått or everyday measure) in the mid 1800's, because Swedish scientists had been using Decimal Inches and Decimal Lines (1 Fot = 29·7 cm = 10 Decimaltum = 100 Decimallinier) since the middle of the previous century. The latter or Decimalmått were officially introduced for all purposes in the 1850's. (25·00 Swedish decimal inches = 29·25 English inches.)

APPENDIX II—CONVERSION OF ANCIENT UNITS

Conversion of Paris Lines into Millibars

Paris Lines	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
					millibars					
310	932·3	932·6	932·9	933·2	933·5	933·8	934·1	934·4	934·7	935·0
311	35·3	35·6	35·9	36·2	36·5	36·8	37·1	37·4	37·7	38·0
312	38·3	38·6	38·9	39·2	39·5	39·8	40·1	40·4	40·7	41·0
313	41·3	41·6	41·9	42·2	42·5	42·8	43·1	43·4	43·7	44·0
314	44·3	44·6	44·9	45·2	45·5	45·8	46·1	46·4	46·7	47·0
315	47·3	47·6	47·9	48·2	48·5	48·8	49·1	49·4	49·7	50·0
316	50·3	50·6	51·0	51·3	51·6	51·9	52·2	52·5	52·8	53·1
317	53·4	53·7	54·0	54·3	54·6	54·9	55·2	55·5	55·8	56·1
318	56·4	56·7	57·0	57·3	57·6	57·9	58·2	58·5	58·8	59·1
319	59·4	59·7	60·0	60·3	60·6	60·9	61·2	61·5	61·8	62·1
320	62·4	62·7	63·0	63·3	63·6	63·9	64·2	64·5	64·8	65·1
321	65·4	65·7	66·0	66·3	66·6	66·9	67·2	67·5	67·8	68·1
322	68·4	68·7	69·0	69·3	69·6	69·9	70·2	70·5	70·8	71·1
323	71·4	71·7	72·0	72·3	72·6	72·9	73·2	73·5	73·8	74·1
324	74·4	74·7	75·0	75·3	75·6	75·9	76·2	76·5	76·8	77·1
325	77·4	77·7	78·0	78·3	78·6	78·9	79·2	79·5	79·8	80·1
326	80·4	80·7	81·0	81·3	81·6	81·9	82·2	82·5	82·8	83·1
327	83·4	83·7	84·0	84·3	84·6	84·9	85·2	85·5	85·8	86·1
328	86·4	86·7	87·0	87·3	87·6	87·9	88·2	88·5	88·8	89·1
329	89·4	89·7	90·0	90·3	90·6	90·9	91·2	91·6	91·9	92·2
330	92·5	92·8	93·1	93·4	93·7	94·0	94·3	94·6	94·9	95·2
331	95·5	95·8	96·1	96·4	96·7	97·0	97·3	97·6	97·9	98·2
332	98·5	98·8	99·1	99·4	99·7	1000·0	1000·3	1000·6	1000·9	1001·2
333	1001·5	1001·8	1002·1	1002·4	1002·7	03·0	03·3	03·6	03·9	04·2
334	04·5	04·8	05·1	05·4	05·7	06·0	06·3	06·6	06·9	07·2
335	07·5	07·8	08·1	08·4	08·7	09·0	09·3	09·6	09·9	10·2
336	10·5	10·8	11·1	11·4	11·7	12·0	12·3	12·6	12·9	13·2
337	13·5	13·8	14·1	14·4	14·7	15·0	15·3	15·6	15·9	16·2
338	16·5	16·8	17·1	17·4	17·7	18·0	18·3	18·6	18·9	19·2
339	19·5	19·8	20·1	20·4	20·7	21·0	21·3	21·6	21·9	22·2
340	22·5	22·8	23·1	23·4	23·7	24·0	24·3	24·6	24·9	25·2
341	25·5	25·8	26·1	26·4	26·7	27·0	27·3	27·6	27·9	28·2
342	28·5	28·8	29·1	29·4	29·7	30·0	30·3	30·6	30·9	31·2
343	31·5	31·9	32·2	32·5	32·8	33·1	33·4	33·7	34·0	34·3
344	34·6	34·9	35·2	35·5	35·8	36·1	36·4	36·7	37·0	37·3
345	37·6	37·9	38·2	38·5	38·8	39·1	39·4	39·7	40·0	40·3
346	40·6	40·9	41·2	41·5	41·8	42·1	42·4	42·7	43·0	43·3
347	43·6	43·9	44·2	44·5	44·8	45·1	45·4	45·7	46·0	46·3
348	46·6	46·9	47·2	47·5	47·8	48·1	48·4	48·7	49·0	49·3
349	49·6	49·9	50·2	50·5	50·8	51·1	51·4	51·7	52·0	52·3

APPENDIX III—TEMPERATURE EQUIVALENTS

Conversion of early temperature scales encountered in working upon 18th century (and earlier) observations demands some knowledge of the history of the thermometer, the development of a scale for it and the difficulties met. The first instruments of this kind ('thermoscopes') were probably made by Galileo in 1597 and after. The expansion of air, and later of water, was used. The first thermometer, properly so called, with a closed stem to exclude effects of the pressure of the atmosphere, is attributed to Ferdinand II, Grand Duke of Tuscany, in 1641. His thermometer was the first to use alcohol ('spirit of wine') as the substance whose expansion was measured. Fahrenheit introduced the use of mercury ('quicksilver') about 1724, being already aware that the mercury in the column of a barometer expanded and contracted as the temperature of the instrument rose and fell (Hellmann,[1]* Henning,[2] Schneider-Carius[3]).

Fahrenheit was a glass-blower of Danzig; he is remembered for the manufacture of more reliable thermometers than had been available before, as well as for the scale named after him. Defects of the glass itself, the bore of the tube, the purification of the spirit and probably also of scales engraved on wooden mounts were, and had been, a cause of unsatisfactory behaviour and ageing of the early thermometers. Furthermore, the question of reasonable exposure of the instrument to the air whose temperature it was desired to measure was more difficult, and took much longer, to solve than satisfactory exposure of the barometer. The best early thermometer exposures were on north walls out of doors or in other, sometimes unspecified, shaded positions (cf. Manley[4,5]). Rougher approximations to the outside air temperature may be deduced from measurements in unheated rooms, preferably with open windows and a north aspect, after studying the comparison between readings obtained in such places nowadays with those in a standard exposure.

Apart from the Fahrenheit and Réaumur temperature scales, introduced in their present form in 1717 and 1731 respectively, and still in official or unofficial use in various parts of the world, the most widely used early scales appear to have been those developed by the philosophers of the (later proscribed) 'Accademia del Cimento' in Florence probably in the 1640's, especially their so-called 'Little Thermometer', and the 'Royal Society's Thermometers constructed by Mr. Hawksbee' in the late 17th and early 18th centuries, otherwise known as Hawksbee's Second Thermometer. The Angeli Monastery at Florence kept a register of temperature observations from December 1654 to March 1670, taken five or more times daily, parts of which have survived (Libri,[6] Hellmann[7]). Father Raineri, a pupil of Galileo, and Father Antinori, supported by the interest of the Grand Duke Ferdinand II until the latter's death, seem to have taken the main part in this work. The Florentine thermometers, especially the Little (or 50-degree) thermometer, seem to have been widely distributed in Europe: Libri states that they were in 'universal' use by the late 1600's and continued so for some time into the 18th century.

Hawksbee's thermometers were used not only in England, but also in St. Petersburg, in Uppsala (by Anders Celsius), in France and in central Europe, in North America and in Bengal over various periods between 1708 and the 1770's or later.

No complete accounts of the construction of these scales seem to have come down to us. In practice, conversions have to be based upon (i) incomplete—in some cases, fragmentary—knowledge of the makers' intentions, (ii) comparisons (van Swinden,[8] Libri[6]) of the actual thermometers with later instruments at various dates between the 1730's and 1820's, when the ancient instruments were suffering from the effects of ageing and (iii) critical comparison of the early temperature registers with the weather reported at the same time and of the extreme values with later extremes. This means that conversion tables for the Florentine and Hawksbee thermometers can only be regarded as indicating most probable values.

It is known that it was very early proposed to the Accademia del Cimento, probably in Galileo's lifetime, by Dr. Sanctorio that two fixed points should be used for the extremities of their thermometer scale. Newton was amongst those who designed such a thermometer, calling the freezing-point of water 0° and the normal temperature of the human body 12°. Fahrenheit used three fixed points. It seems probable that the Florentine and Hawksbee scales were based on two or more fixed points, one being taken with the bulb surrounded by melting ice (though even this has not been established with certainty in the case of Hawksbee). It is very doubtful whether the upper fixed point was a satisfactory one; probably it was the blood temperature of cattle. Hawksbee's instruments were perhaps specially prone to defects with ageing; they also gave a slow response, because the bulbs were encased in thick wood, so that comparisons made with other instruments during periods of changing temperature must be unreliable.

Some late 18th century investigators finding Hawksbee's thermometers differing amongst themselves concluded that all observations made with them must be considered as observations lost. Reports of tests in the late 18th and early 19th century of the Florentine thermometers, quoted by van Swinden and Libri, are in agreement, except for a doubt as regards the highest temperatures implied by the 50°R comparison quoted in the Table (p. 16). It is likely that several decades nearer the date of their manufacture, and at the time when they were most used, both the Hawksbee and Florentine thermometers gave more consistent readings. Nevertheless, their records should always be scanned for evidence of a creeping (increasing) calibration error: for this reason, only records extending over many

* Index figures refer to the bibliography on p. 15.

years should be used. Where the instruments were faulty, or became faulty, this should be apparent from a variety of possible consistency checks. Provided proper caution is exercised, the reported readings of some of these ancient instruments should be satisfactory for the temperature correction of mercury column heights read on neighbouring barometers and, in some cases, as an indication of outside air temperatures.

Besides the scales here specified many others were proposed and tried. Van Swinden lists 77, including 4 due to Fahrenheit and 4 to the Florentine Academy. Several variants simply amounted to sub-division of the degree. Hawksbee's First Thermometer (H^I) seems to have used Newton's scale multiplied by 10. Freezing-point was 0° H^I and the normal temperature of the human body, probably taken as about 97°F was 120° H^I; Hawksbee's 'lowest temperature observed in England' (probably in 1684 or 1696) is given as $-50°$ H^I or $+5°F(-15°C)$, the highest as 130° H^I or 102°F (38·9°C)—values which suggest that the thermometers used behaved reasonably, having regard to their probable exposure.

Many other scales besides that of Hawksbee's Second Thermometer (H^{II}), and including Celsius's original scale of 1742, were inverted, with the lowest numbers for the highest temperatures. The scales for which equivalents, based on actual instrumental comparisons, are given in the following Table are those that were most widely used. It is a pity, as regards simplicity of scale, that Hawksbee's Second Thermometer was much more widely used than his First. Some observers using Hawksbee's Second Thermometer even entered 0° in the register when the liquid in the tube went beyond the 0° mark. (Some, but perhaps not all, H^{II} thermometers bore 20 graduations beyond the 0 mark to make them suitable for hot climates.) Nevertheless, it is reasonable to presume that Hawksbee's 'Royal Society pattern' thermometers (H^{II}), which gained such wide acceptance, were mostly reliable in their heyday—at least as reliable as his earlier ones.

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Since these paragraphs were written Dr Walter LENKE has covered some of the same ground in an account of early temperature observations, in which he has drawn attention to the fillip given by the outstanding severity of the winter of 1708–9 in Europe to the development of the thermometer and the demand for its widespread use. (LENKE, W. 1964. Untersuchungen der ältesten Temperaturmessungen mit Hilfe des strengen Winters 1708–1709. Berichte des deutschen Wetterdienstes, Nr 92, Band 13, Offenbach am Main.)

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TABLE OF EQUIVALENTS

°F	°R	Florentine thermometers			Hawksbee II			°C
		I The Big Thermometer	II The Little Thermometer					
		Comparisons by Martine[9*] (1740)	Comparisons by Martine[9*] (1740)	Comparisons by Libri[6*] (1830)	Comparisons by Martine[9*] (1740)	Comparison of Celsius's Hawksbee thermometer at Uppsala in 1739–40	Comparison of John Winthrop's Hawksbee thermometer at Cambridge, Mass. in 1766–73†	
212°	80°							100°
	50°			44°††				62·5°
			50°					53·5°
		100°						51·9°
102°	31·1°	80°	40°					38·9°
95°	28·0°	74°	37·3°					35·0°
90°	25·8°					0°	(0·5°)	32·2°
88°	24·9°	68°	34·7°		0°			31·1°
74°	18·6°	56°	29·4°			20°	21·5°	23·3°
60°	12·5°	44°	24·0°				39·9°	15·6°
58°	11·5°					40°		14·4°
53°	9·3°	38°	21·4°				49·0°	11·7°
50°	8·0°					50°		10·0°
39°	3·1°	26°	16·1°				67·4°	3·9°
34°	0·9°					70°		1·1°
32°	0°	20°	13·5°	13·5°	78·5°	72·5°	76·5°	0°
26°	2·6°					80°		− 3·3°
25°	− 3·1°	14°	10·8°				85·7°	− 3·9°
18°	− 6·3°	8°	8·2°			90°		− 7·8°
11°	− 9·4°	2°	5·5°					−11·7°
10°	− 9·8°					100°		−12·2°
− 1·6°	−15·0°			0°				−18·7°
− 3·4°	−15·8°		0°					−19·7°
− 6°	−16·9°					120°		−21·1°
−10·8°	−19·0°					126°		−23·8°

* Index figures refer to the bibliography on p. 15.

† Of the Hawksbee thermometers used for barometer corrections in the research which is the subject of this Memoir the conversion figures given by John Winthrop's instrument were most applicable. Thomas Barker's 'Royal Society's pattern' thermometer, used in the long record of observations which he kept at Lyndon, Rutland (England) from the 1730's to 1770 also read 76·5° at the freezing-point. (Barker's instrument was not made by Hawksbee but, like others of the time, was made to follow the same specifications (Manley[5*])).

†† A linear scale (as was certainly intended) for the Florentine Little Thermometer would give 58·5° here: 50° on it should correspond to 50·5°C, 40° to 36·7°C, 30° to 22·9°C, 20° to 9·1°C and so on, in reasonable agreement with Martine's comparisons. Martine's are therefore the most probable conversion figures to use for F1[II] temperatures.

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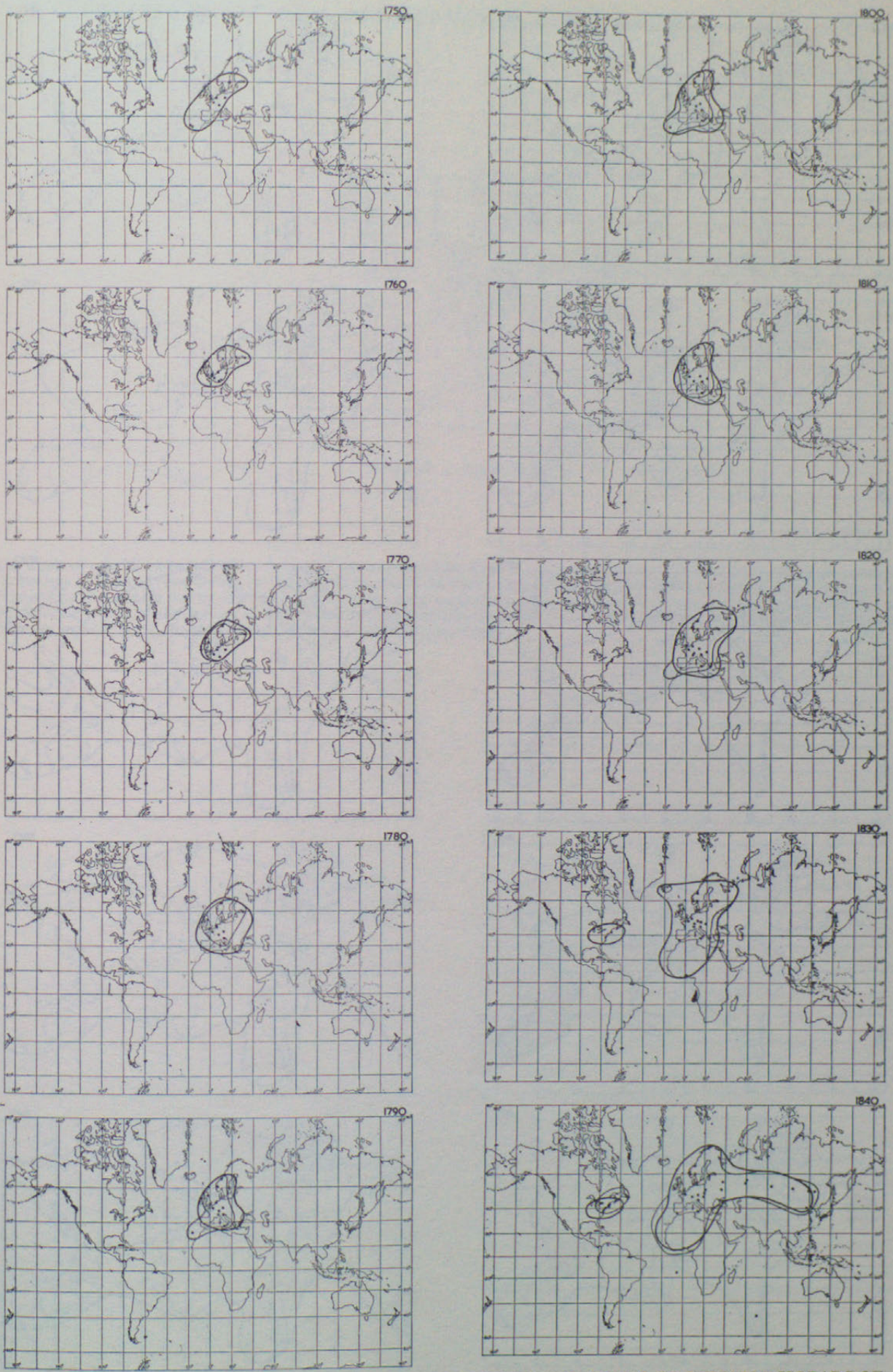
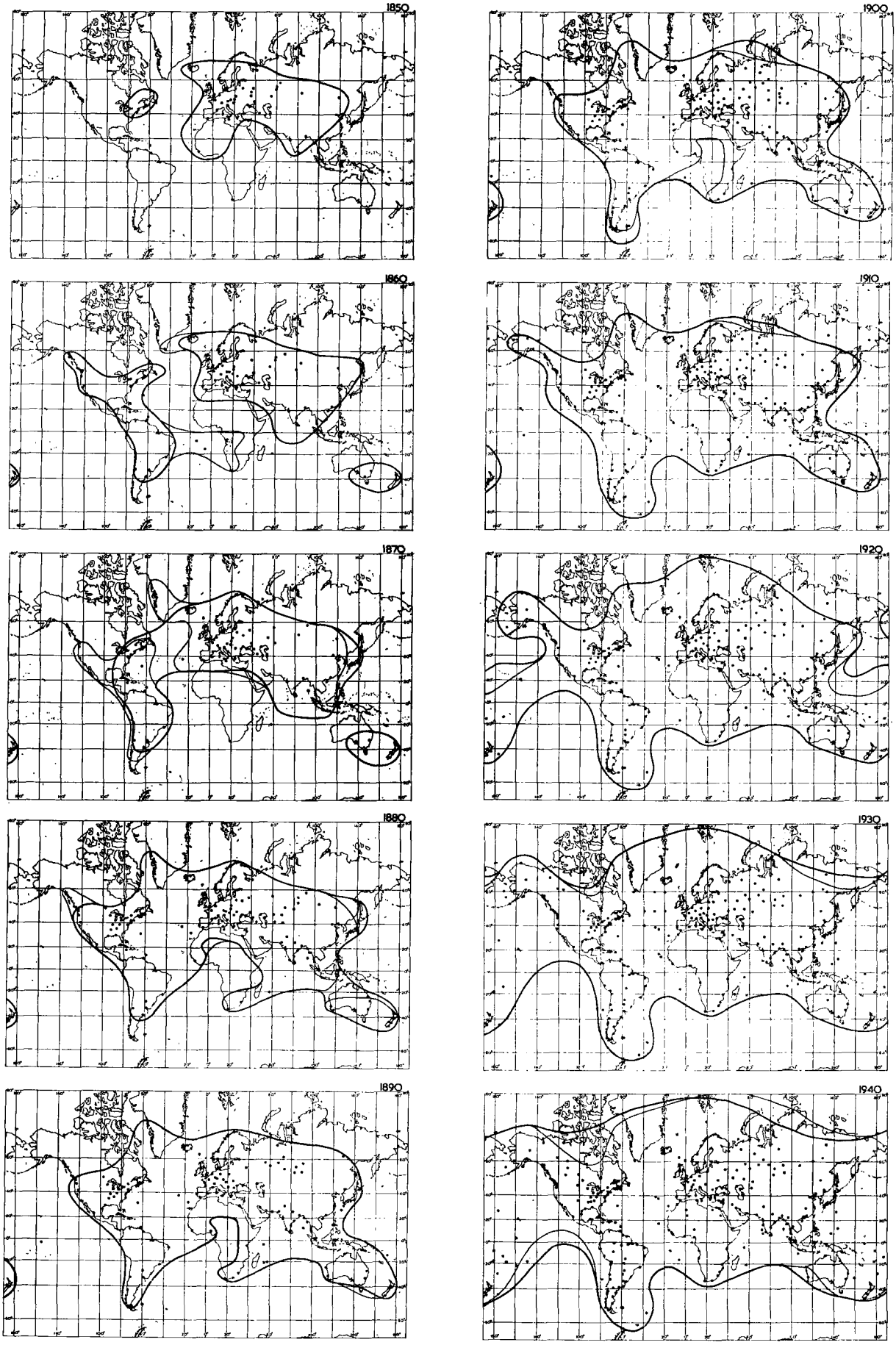


FIGURE 1—NETWORK OF PRESSURE OBSERVATIONS USED AND LIMITS OF RELIABLE ISOBARS OF AVERAGE PRESSURE FOR EVERY 10TH YEAR FROM 1750*



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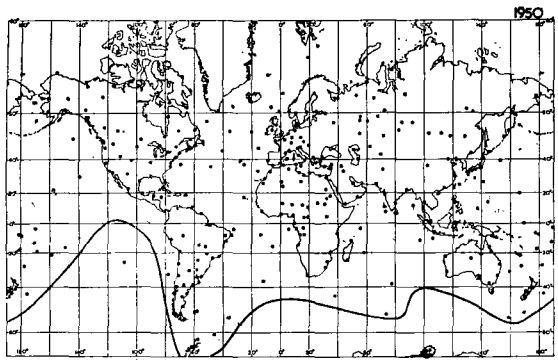


FIGURE 1—CONTINUED

* The limits of reliable isobars (isobars drawn as full lines: standard error ≤ 2·5 mb in January, ≤ 1·0 mb in July) in particular Januarys (thin boundary in Figure 1) and particular Julys (bold boundary line) about the date shown. Dots indicate the positions of place sfor which observations were available during each decade. There was some variation in places available from one year to another, and this accounts for the differing extent of the isobars on the individual maps in Figures 2 and 5. Broken isobars indicate pattern thought reliable, but accuracy not good enough for any measurements to be made from them.

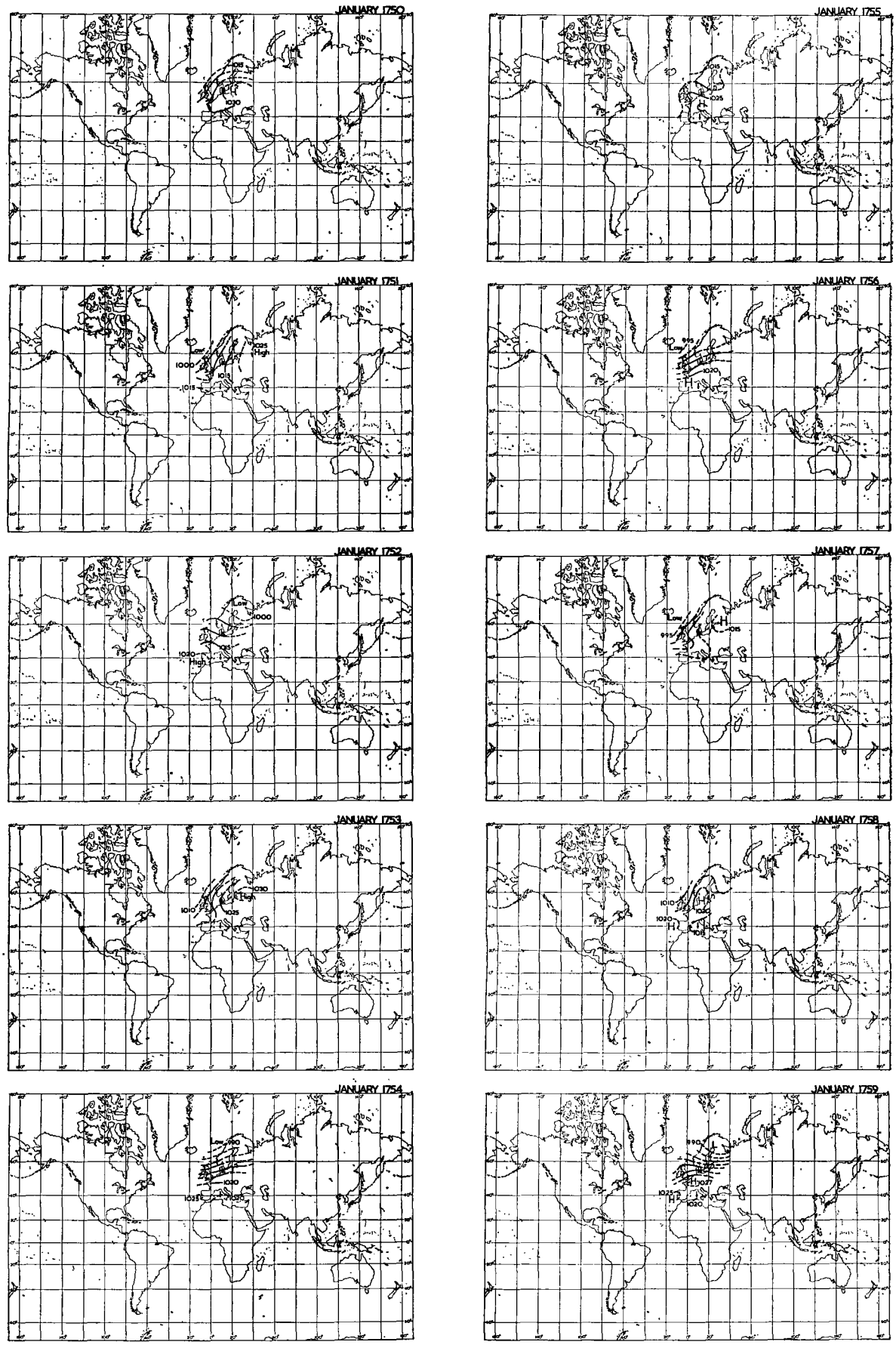
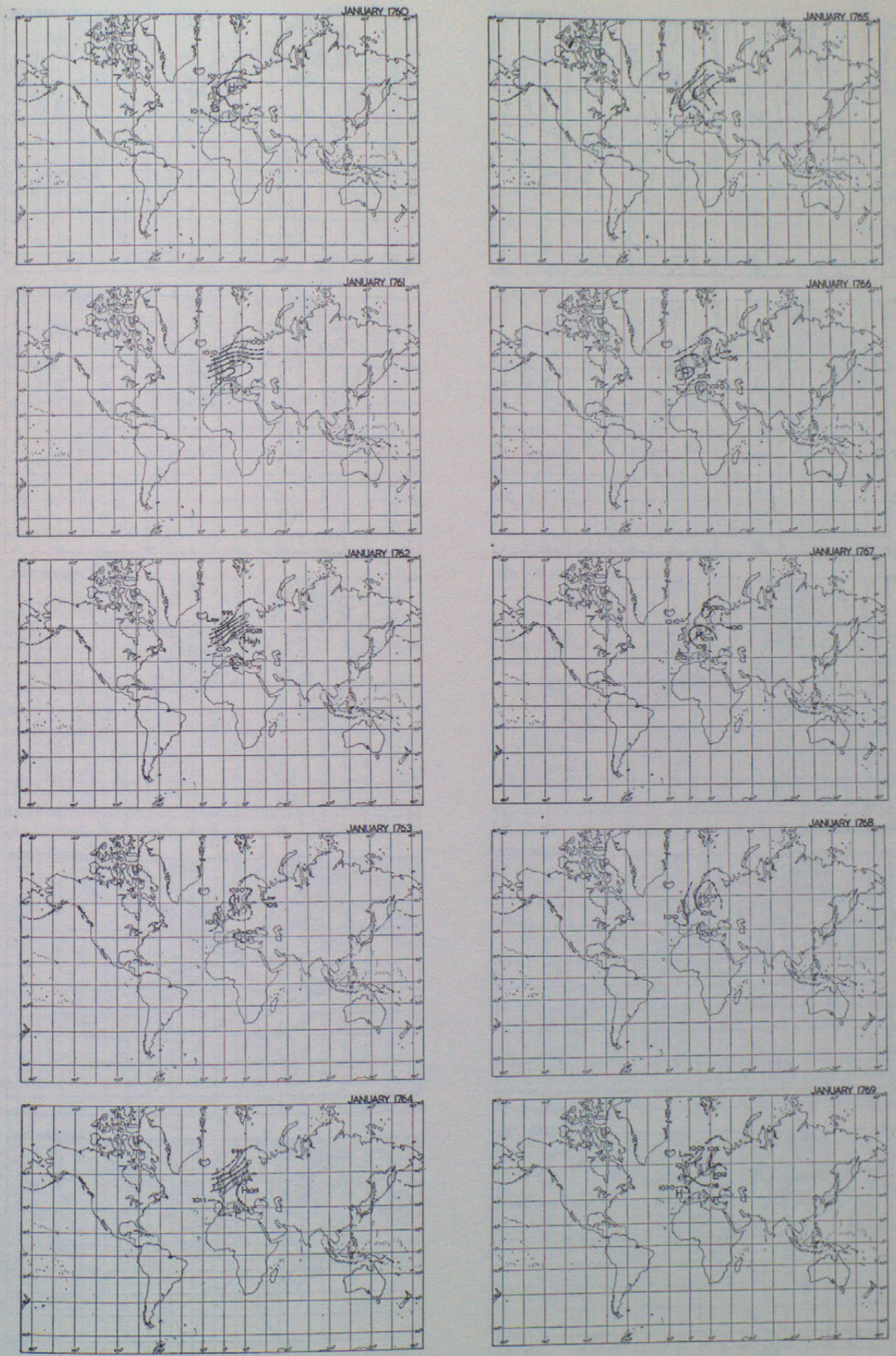


FIGURE 2—MONTHLY MEAN PRESSURE DISTRIBUTION IN JANUARY FOR EACH YEAR FROM 1750



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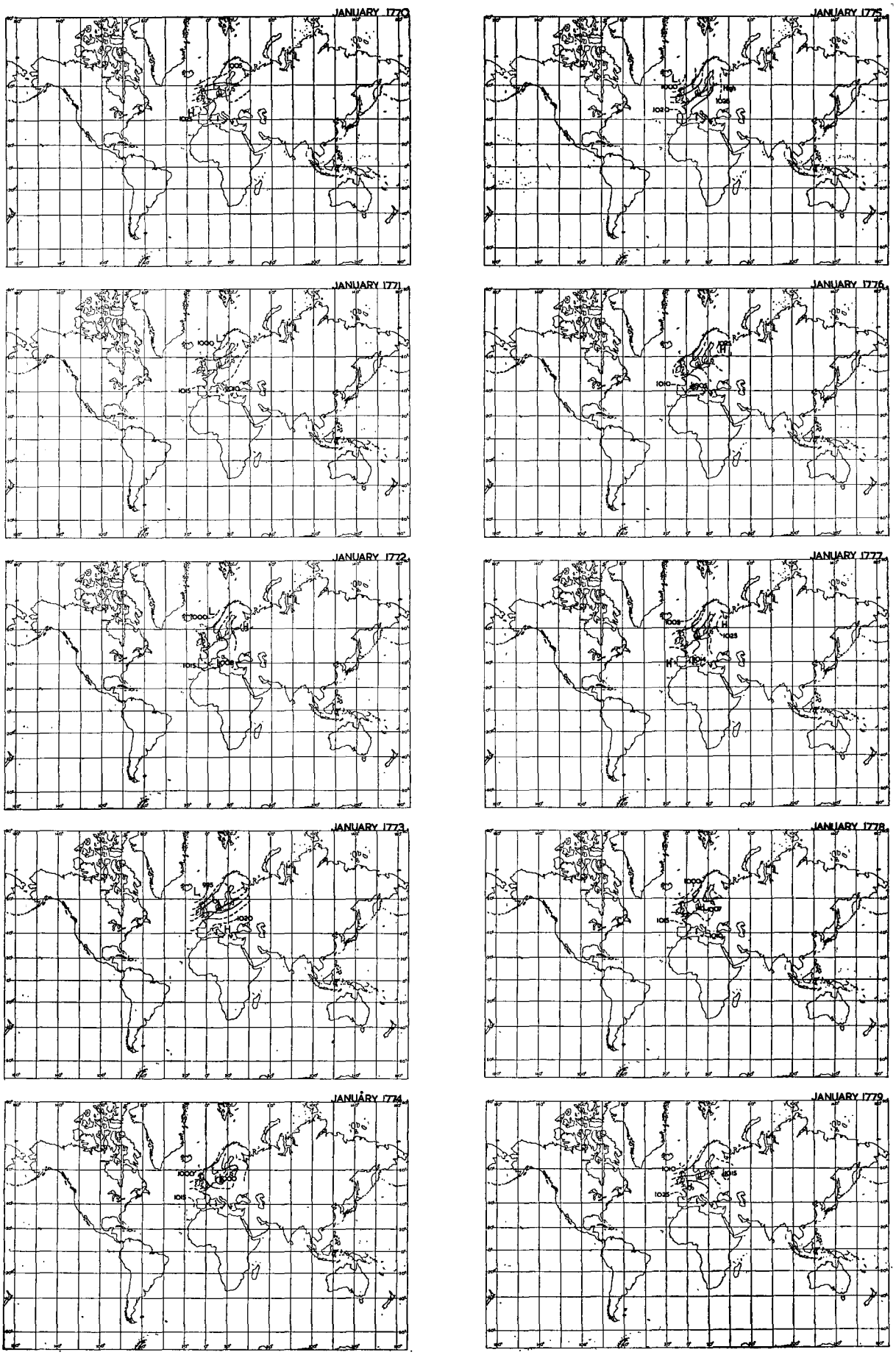

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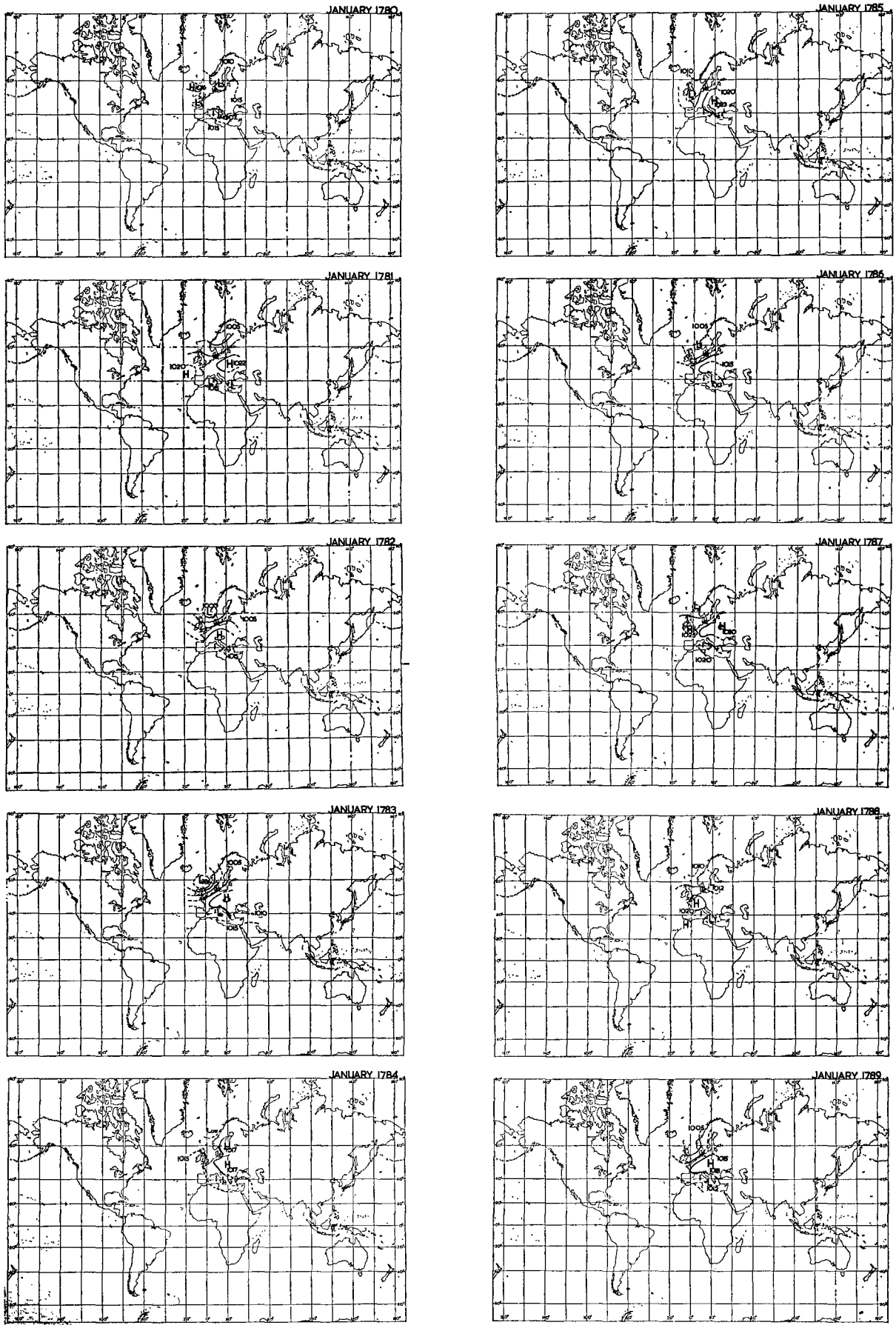

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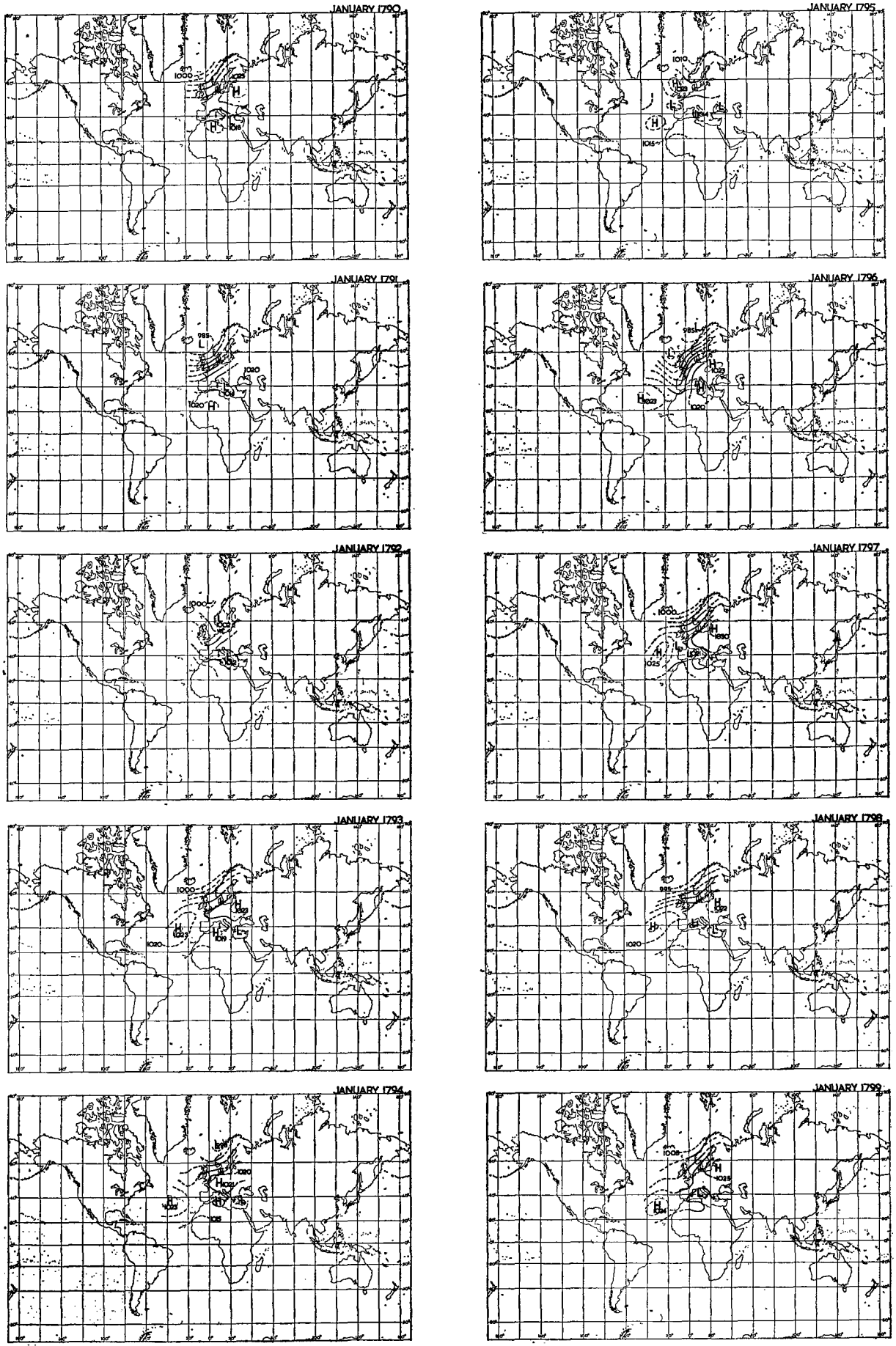

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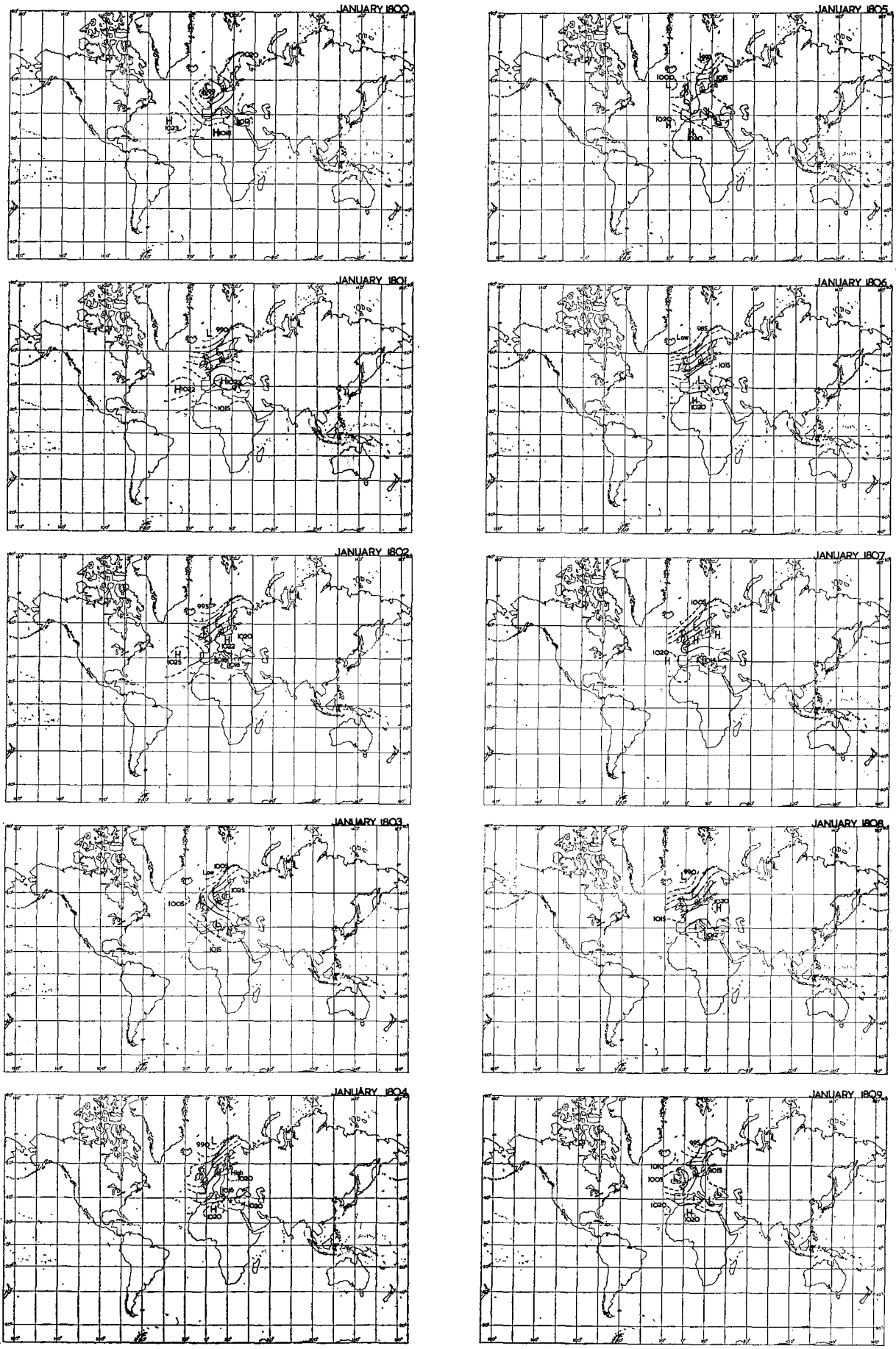

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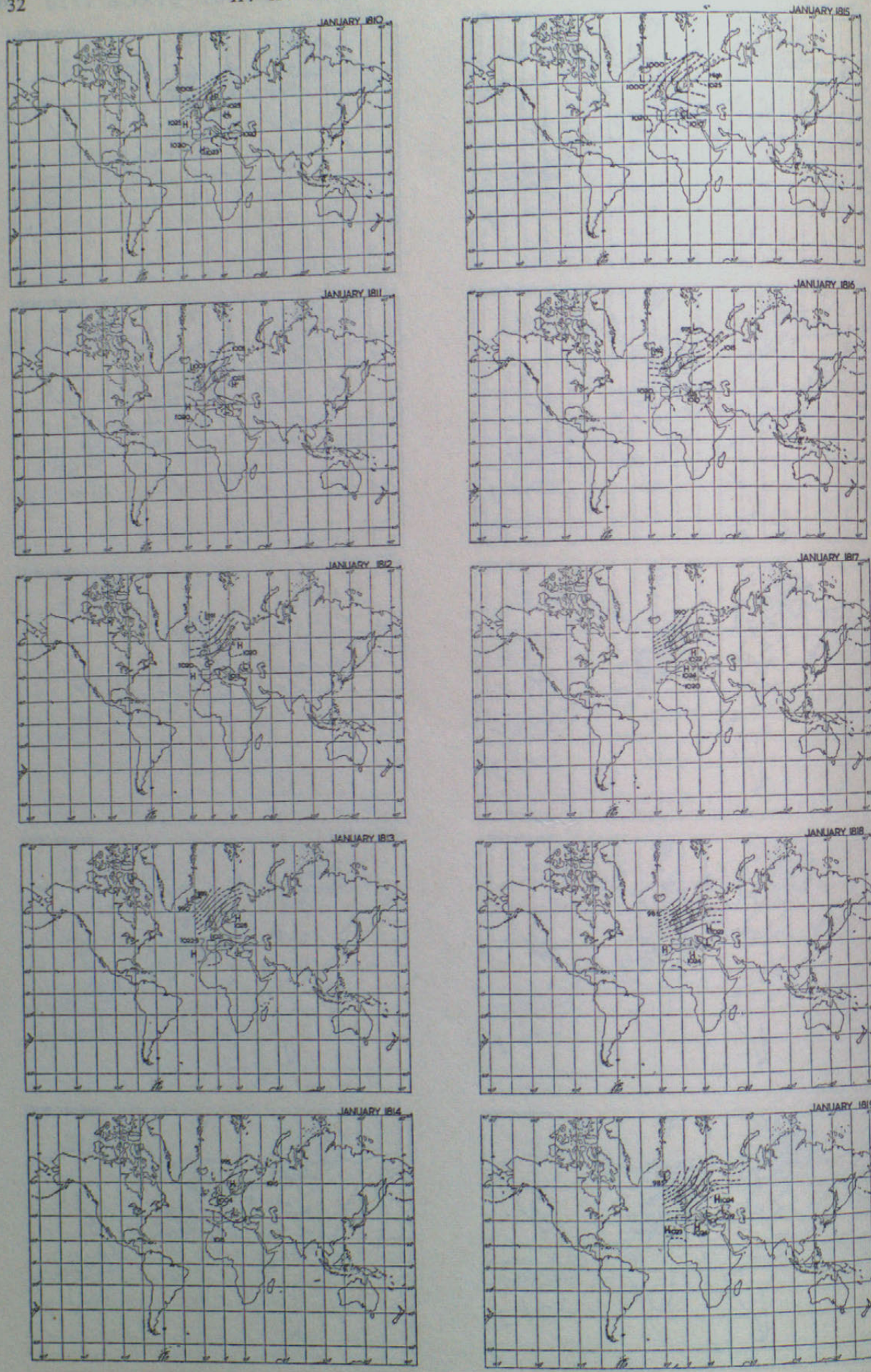

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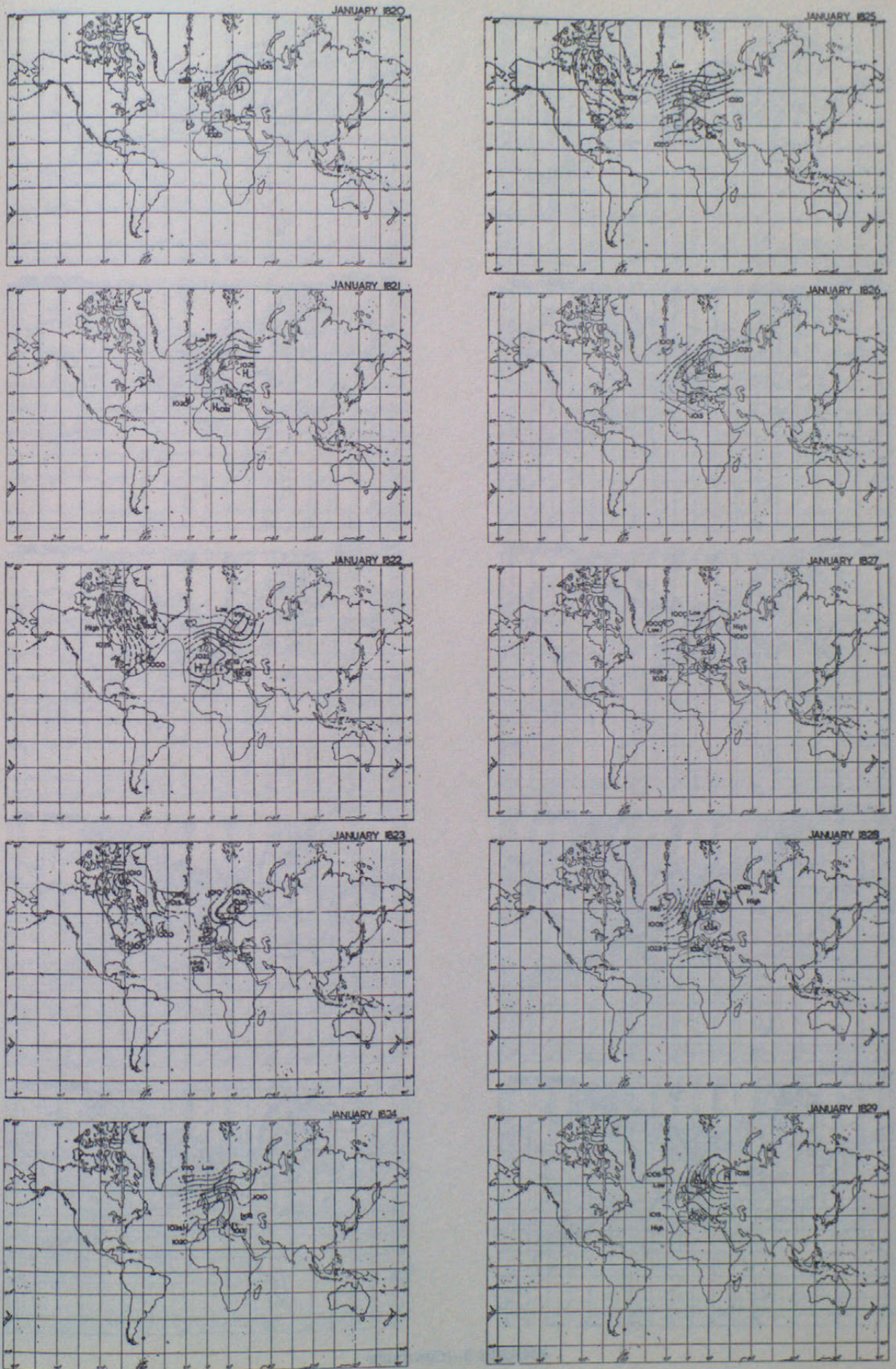

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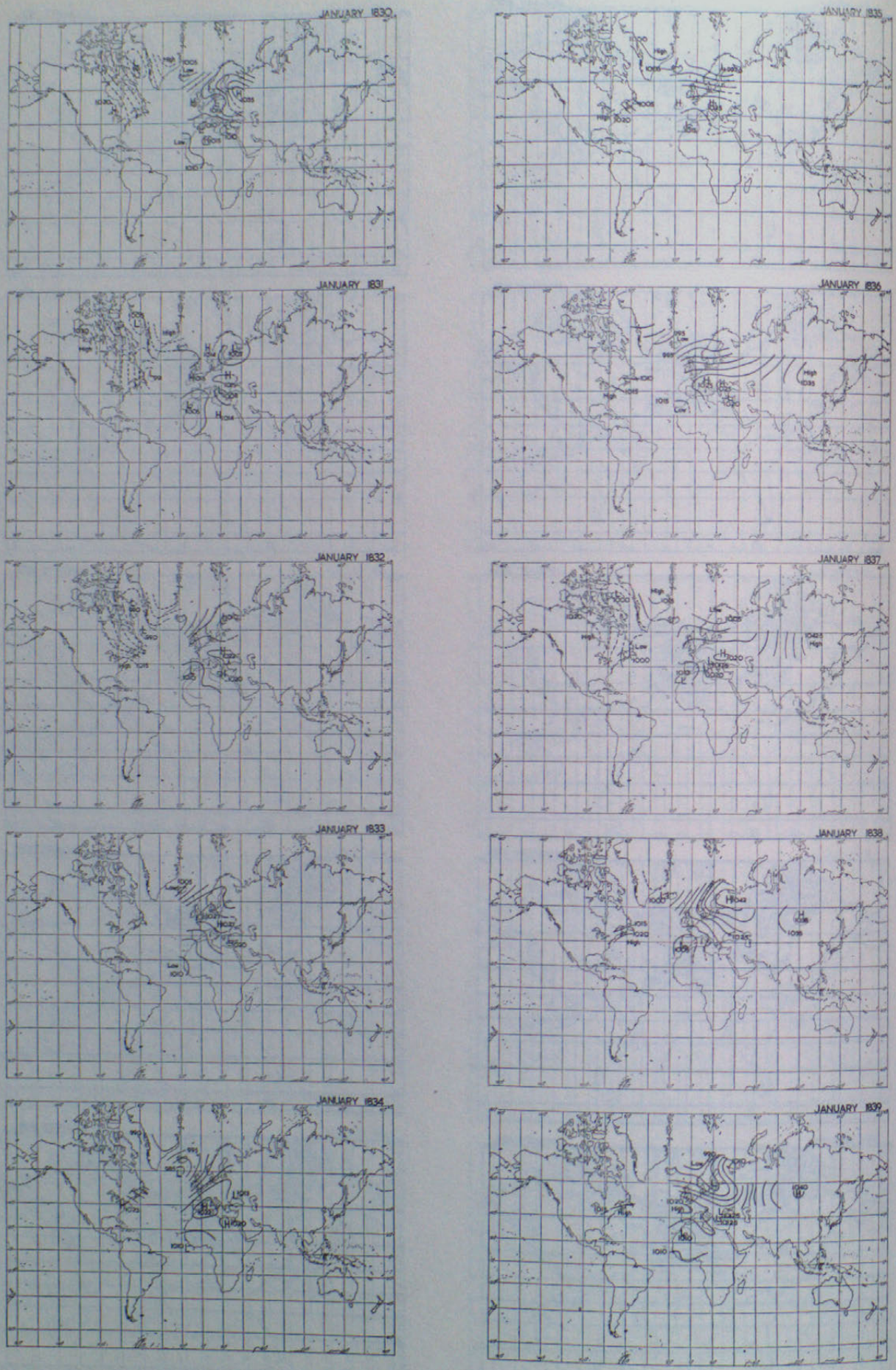

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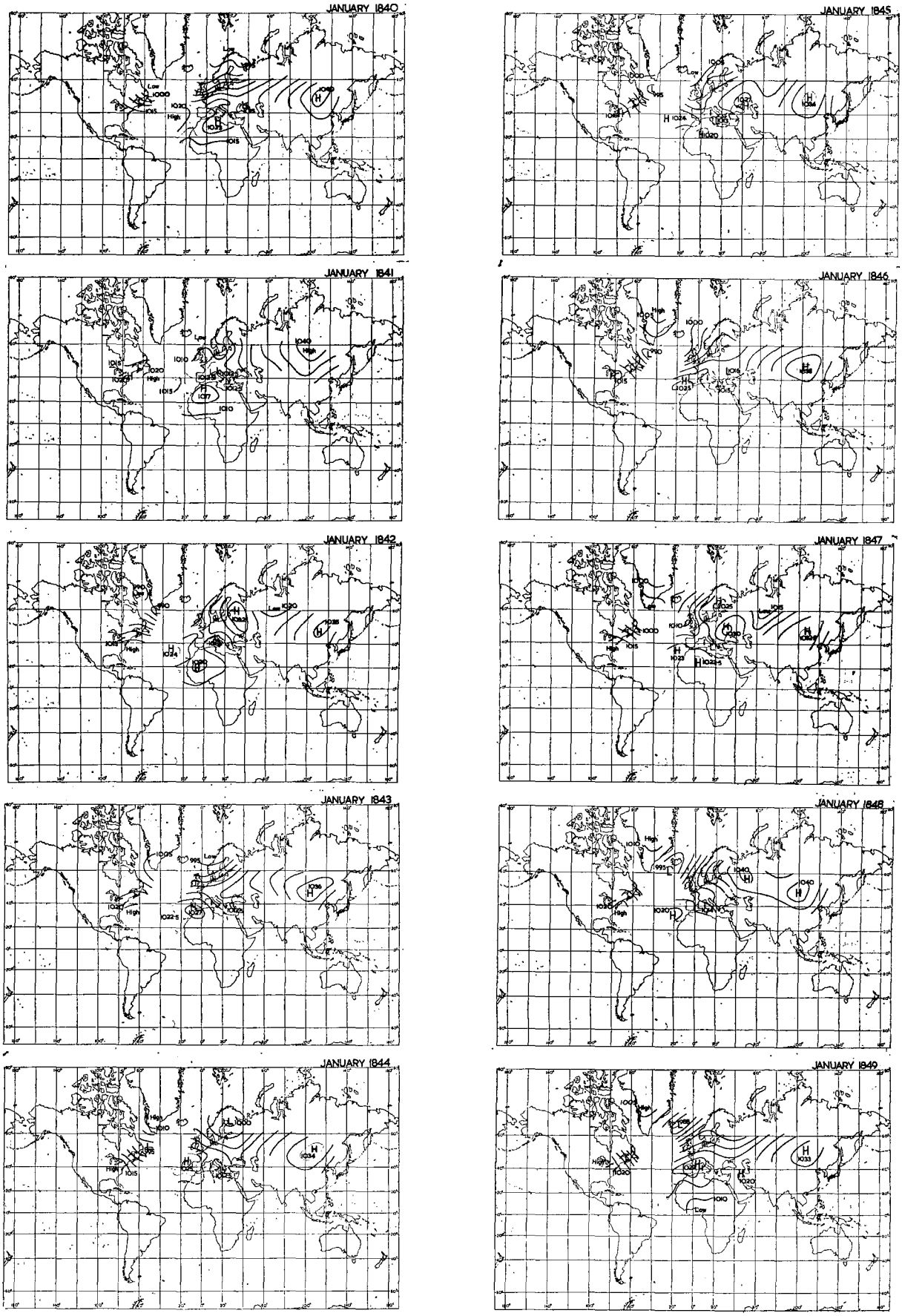

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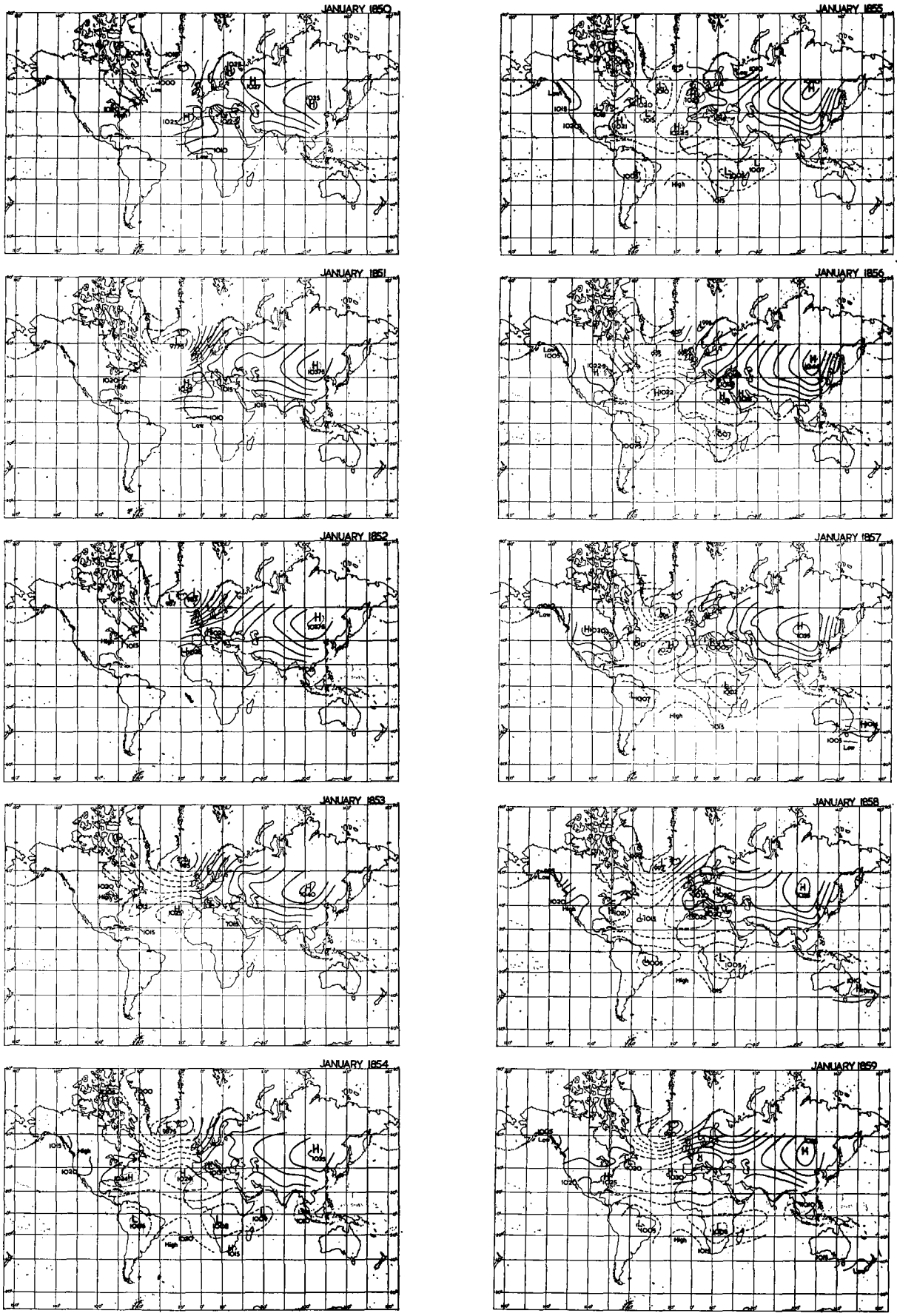

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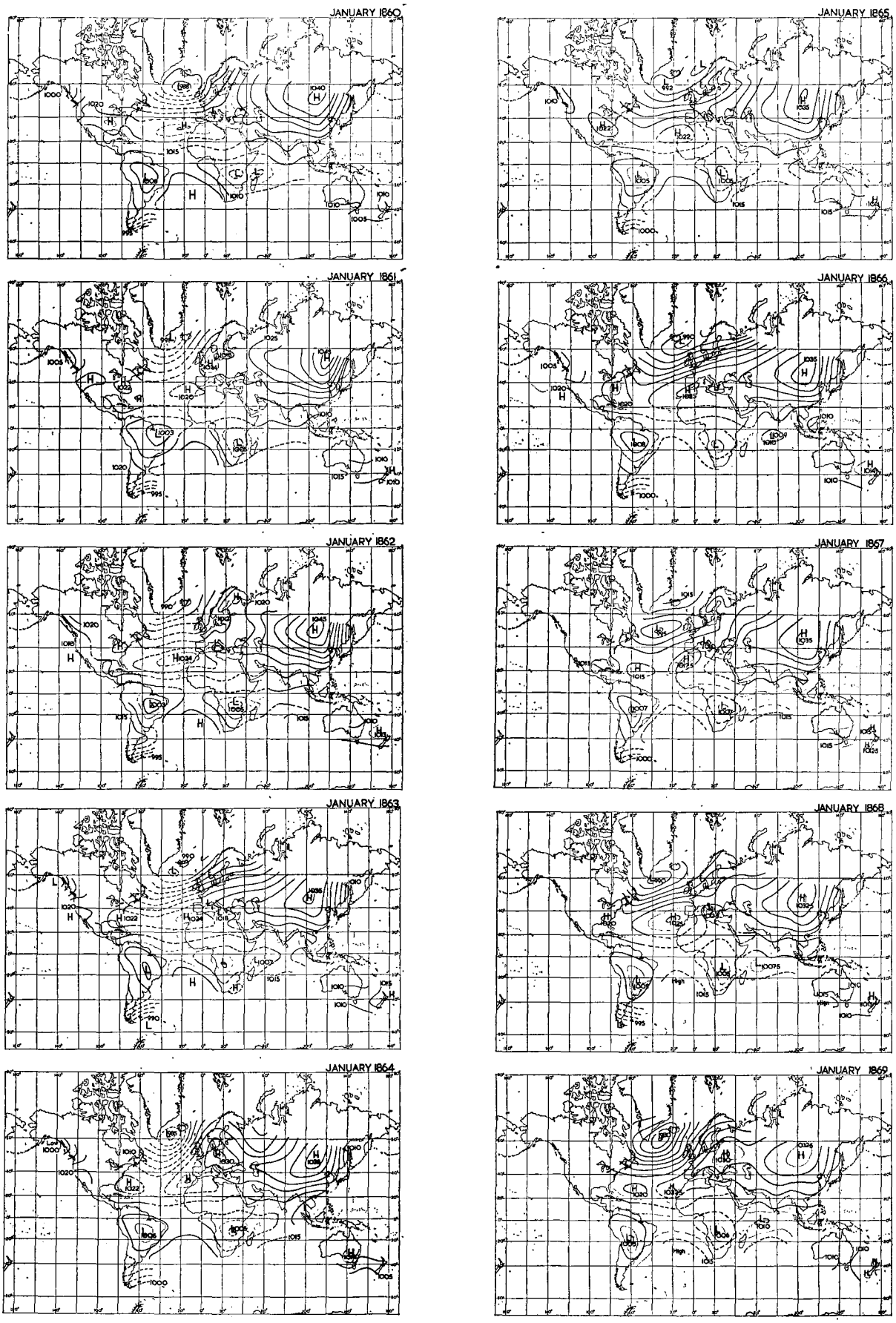

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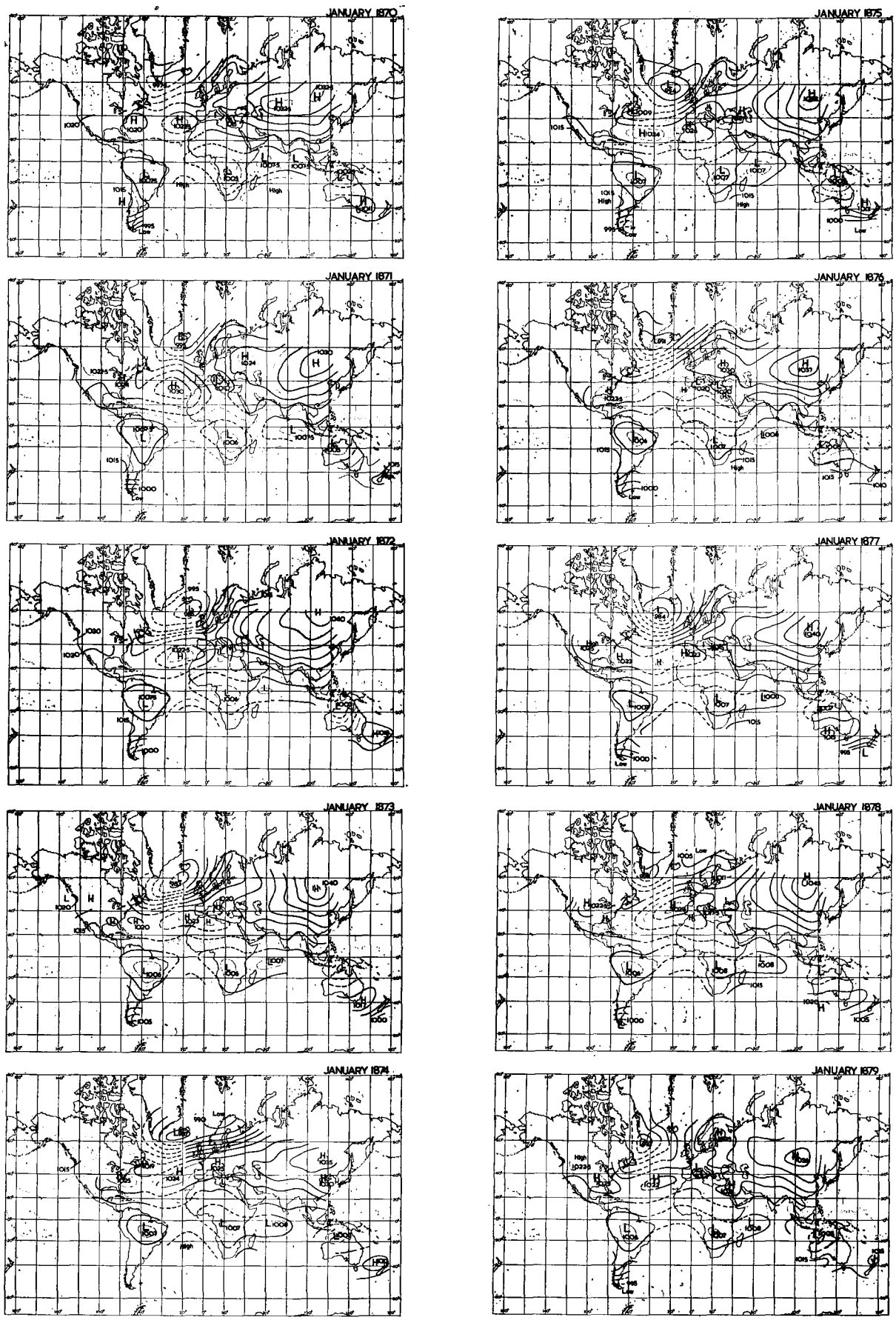

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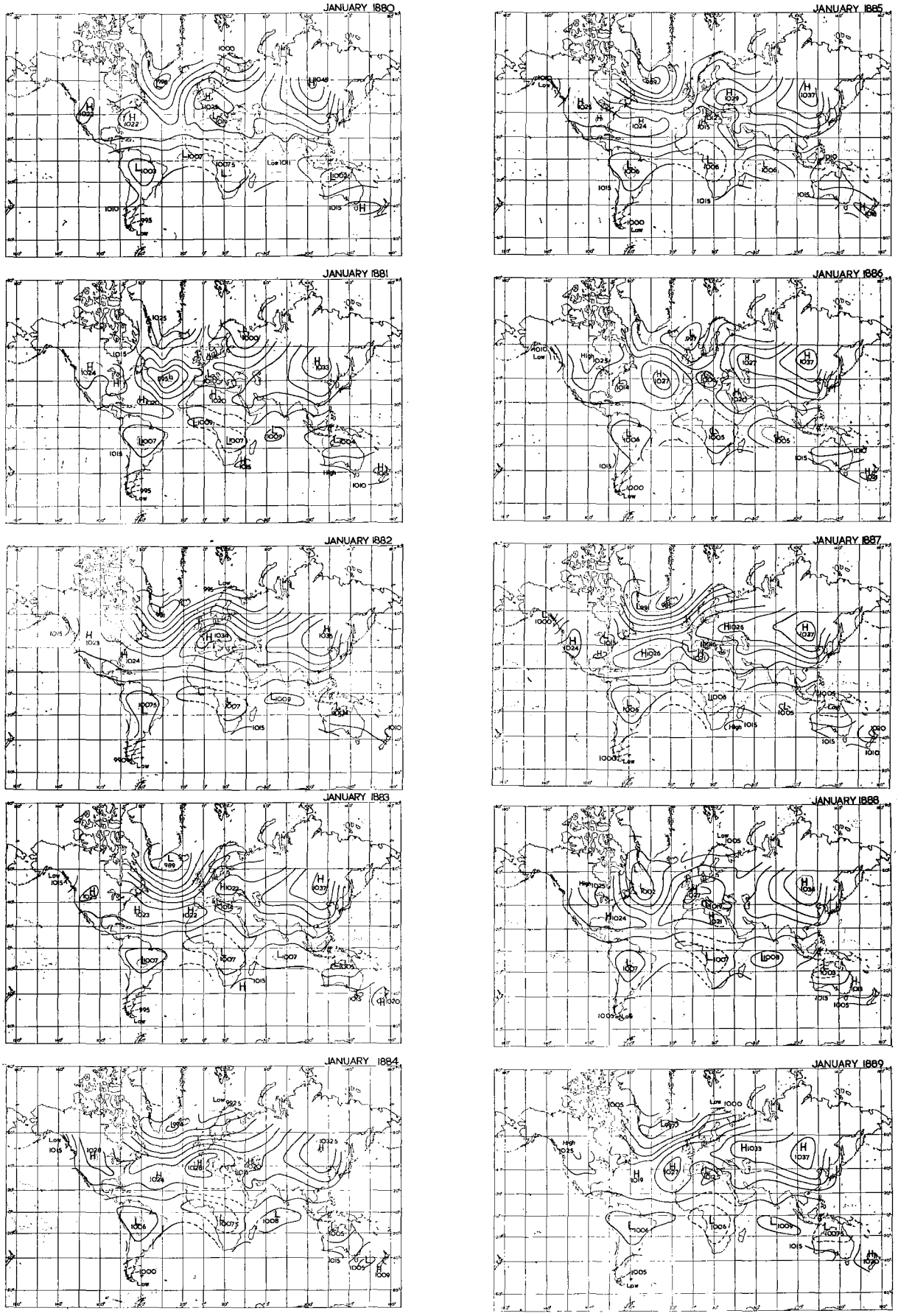
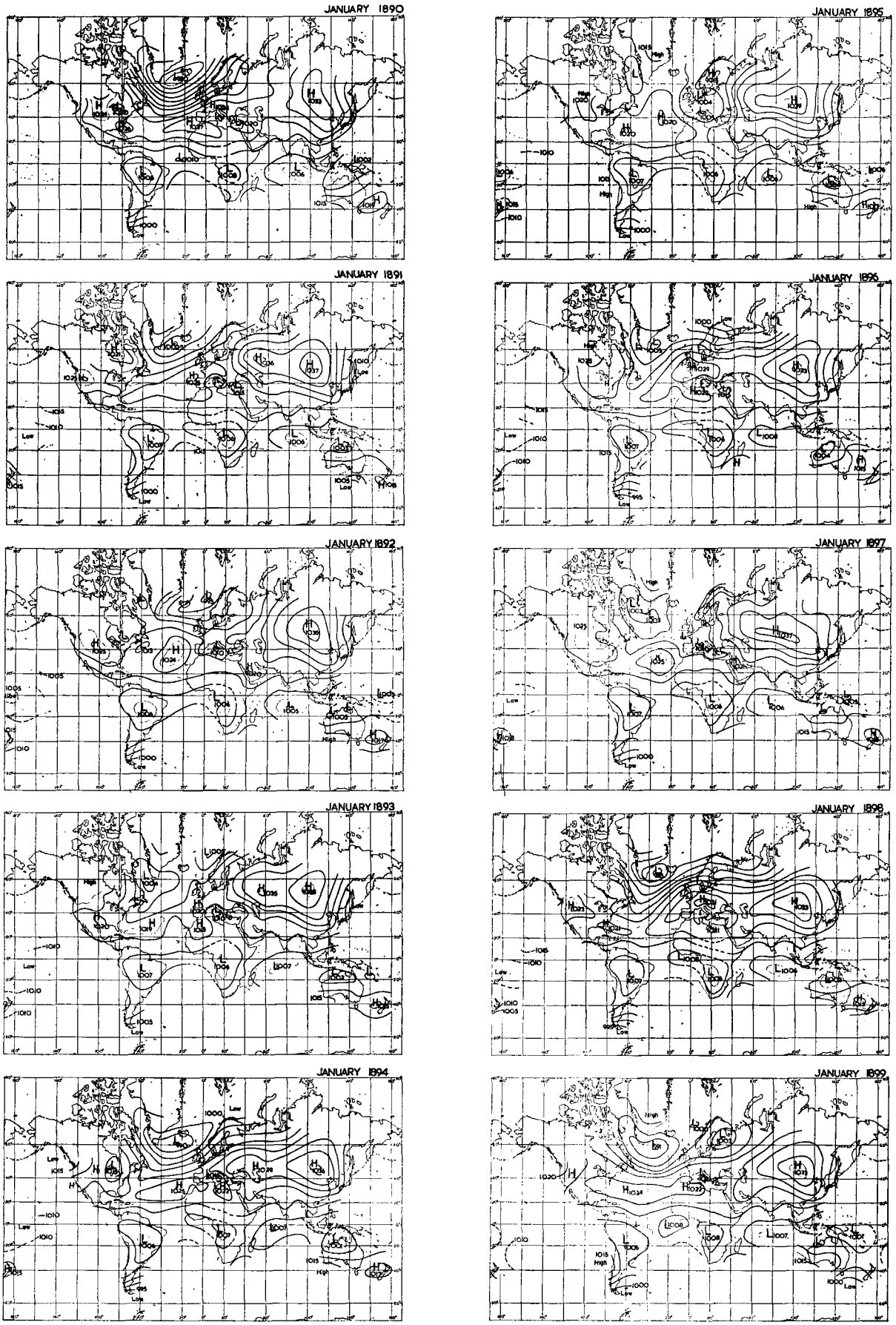


FIGURE 2—CONTINUED



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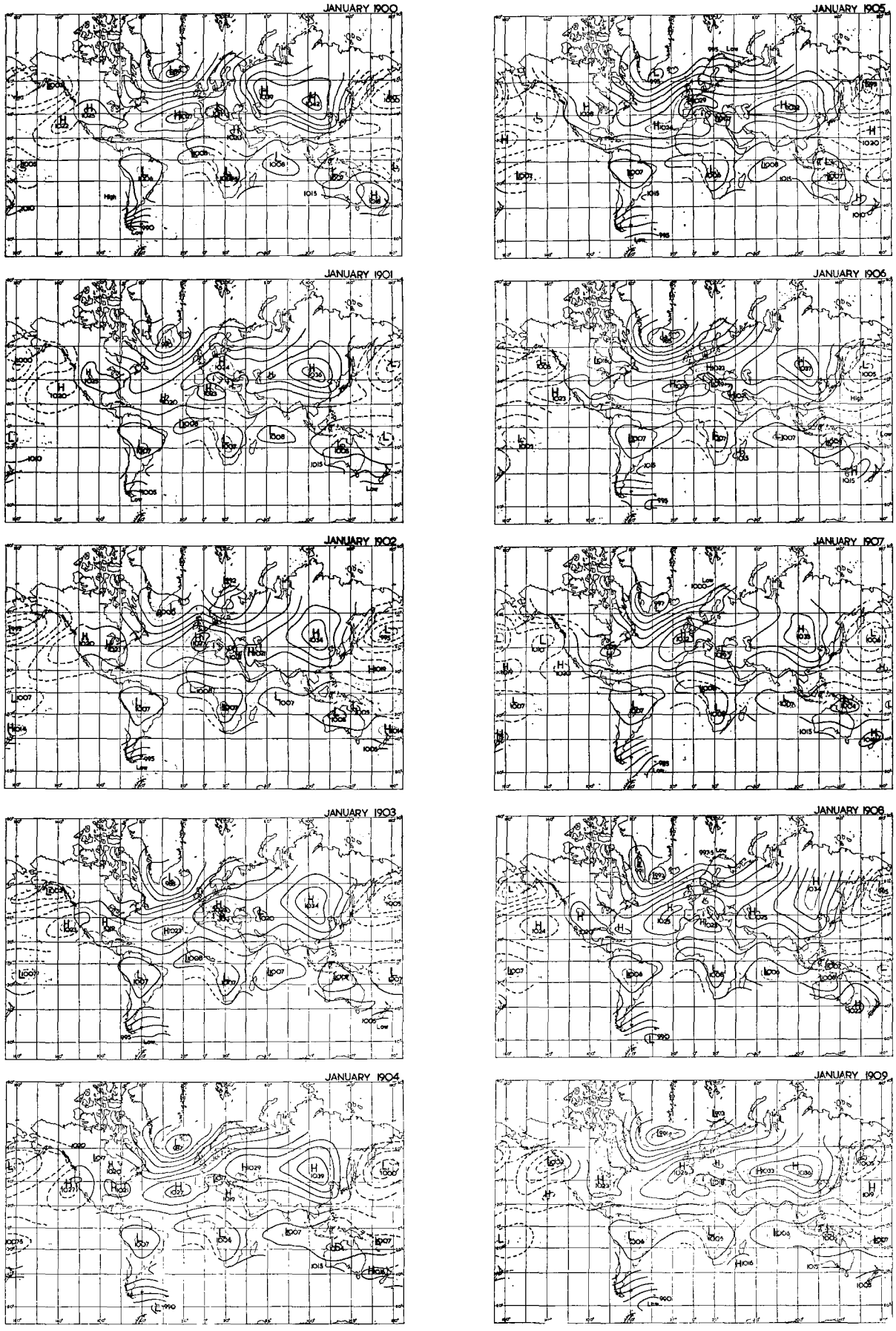

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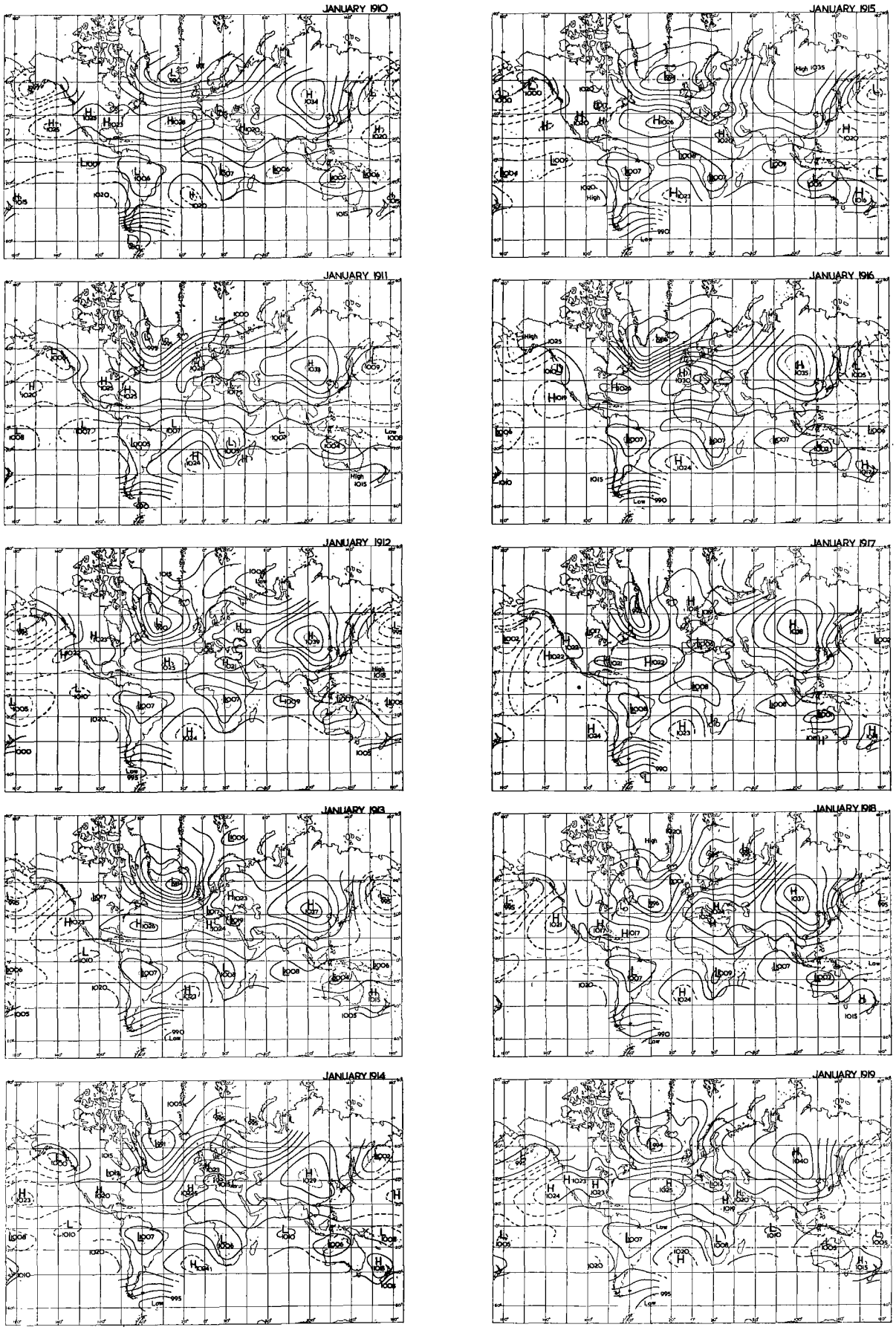

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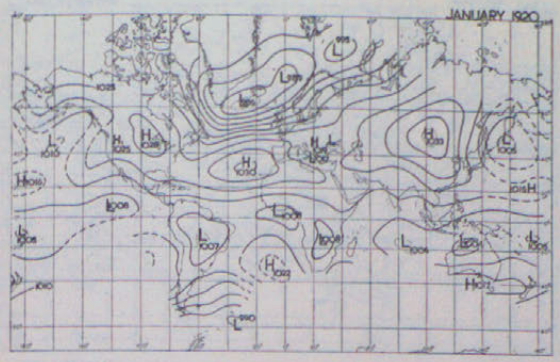

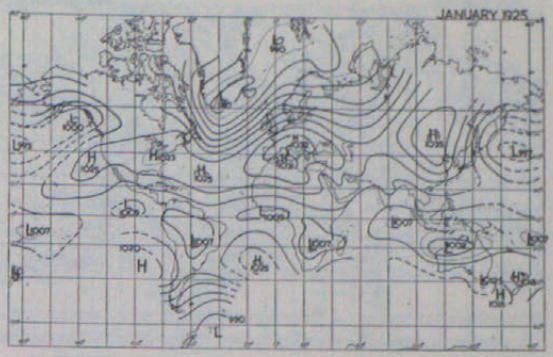

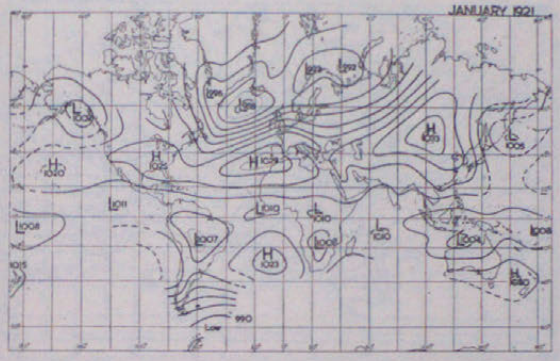

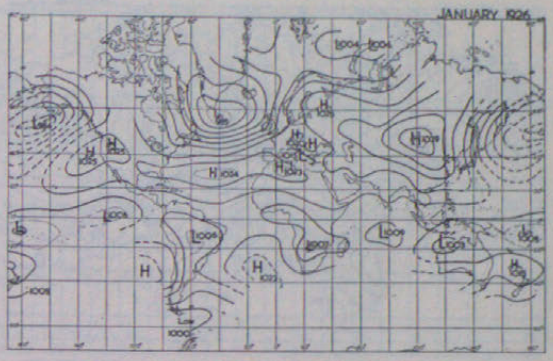

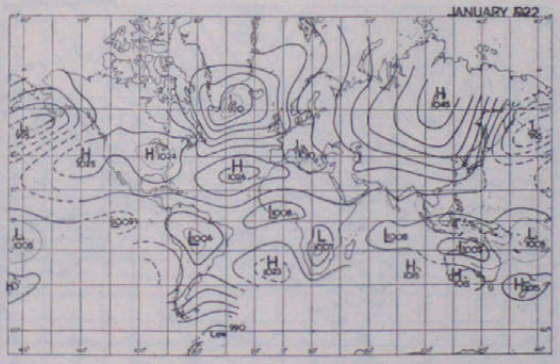

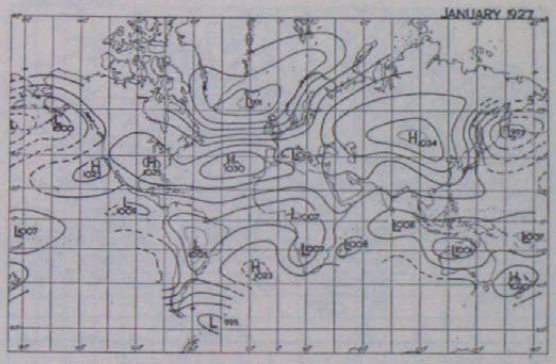

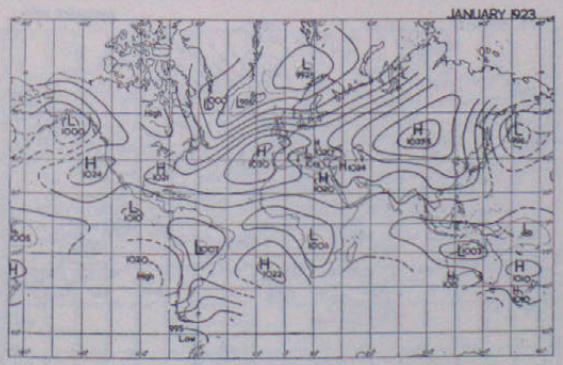

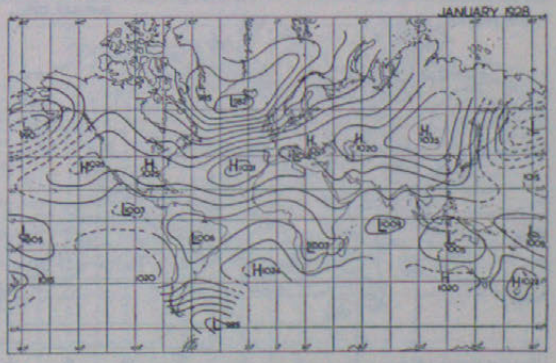

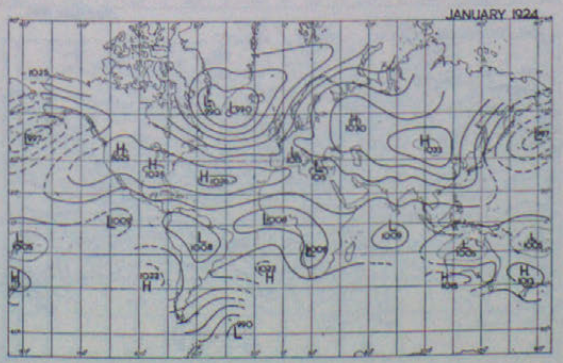

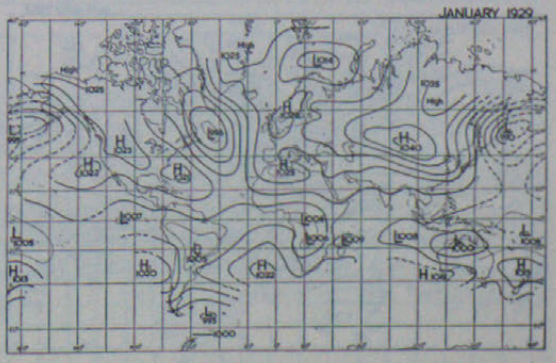

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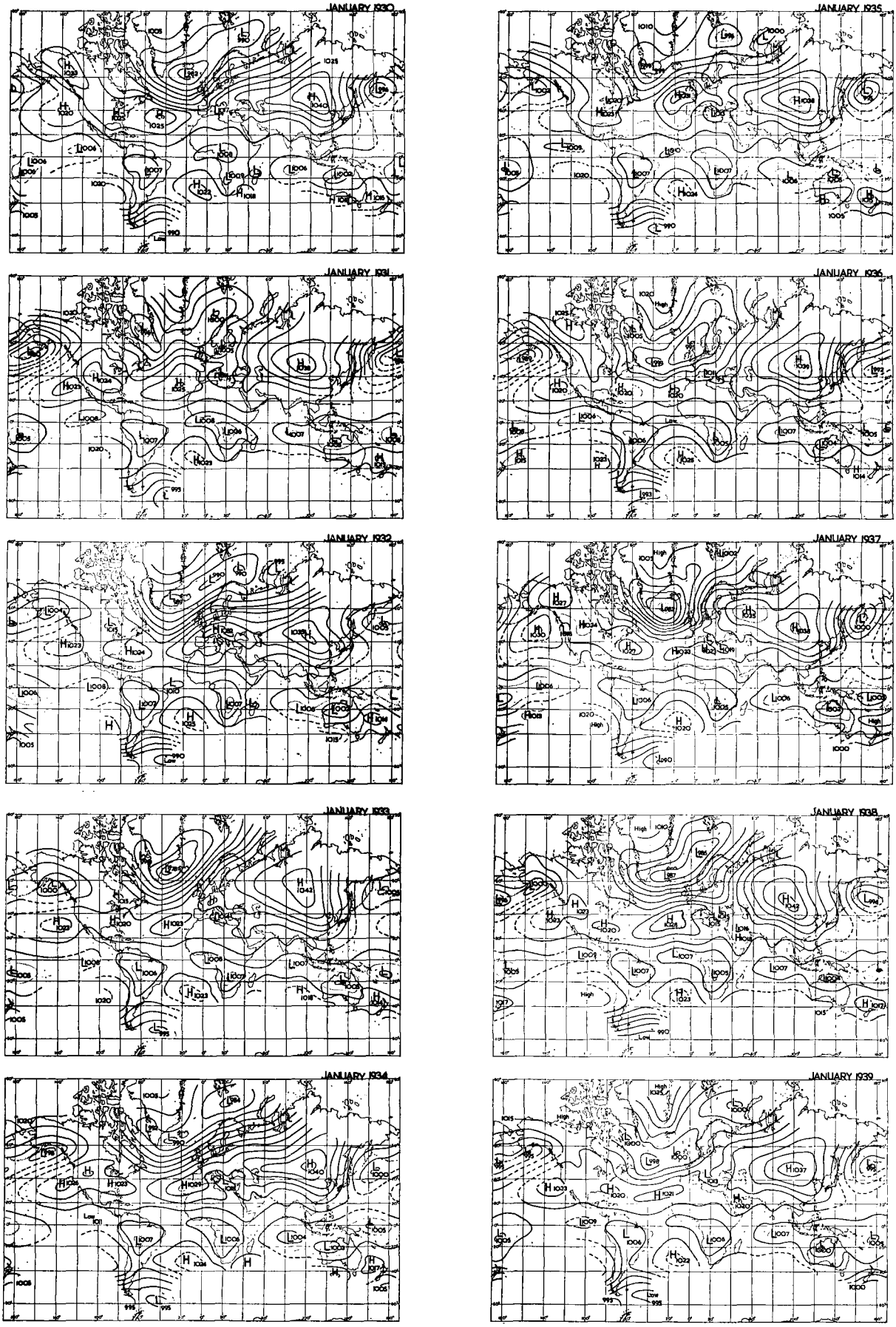

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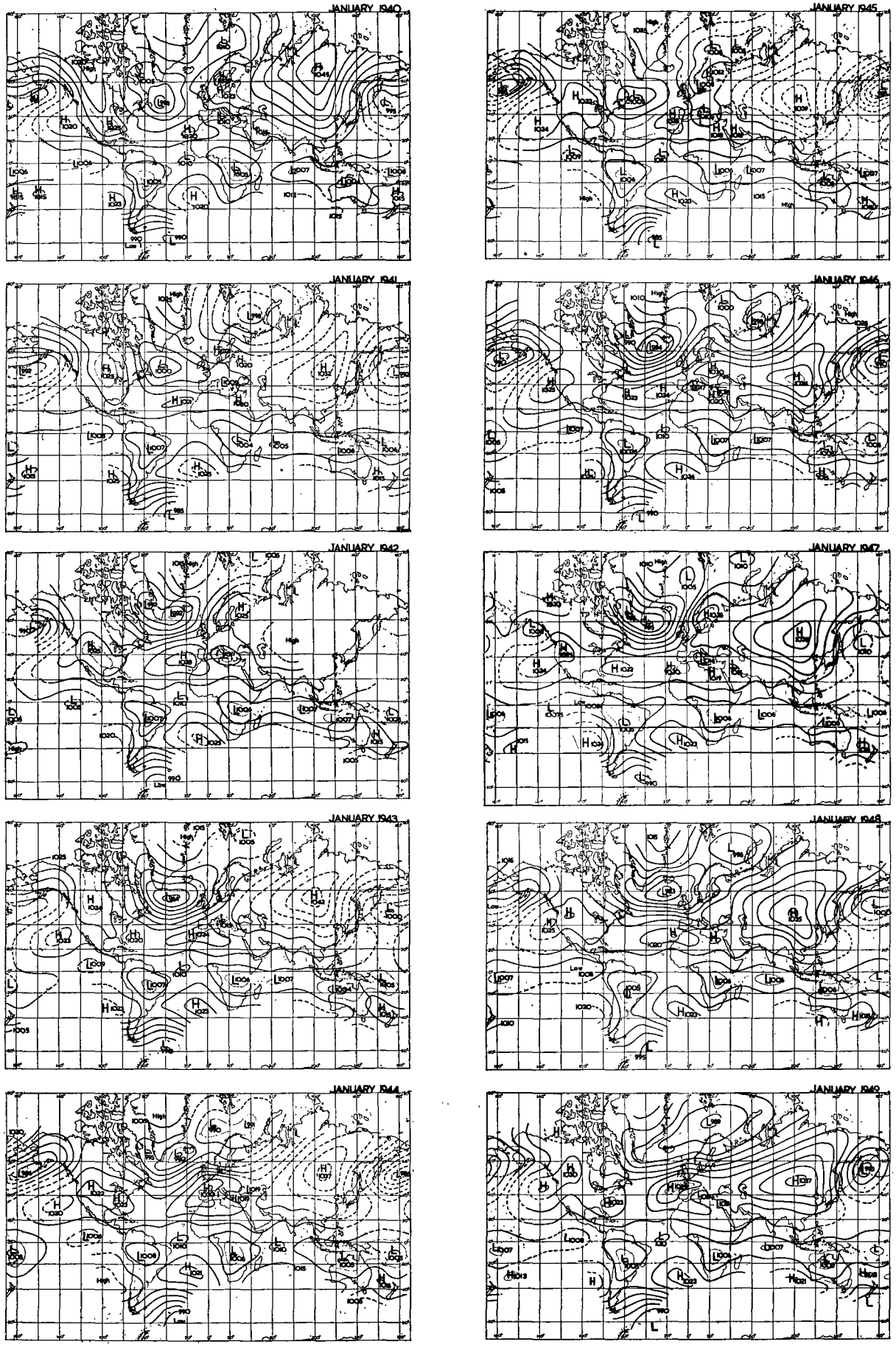

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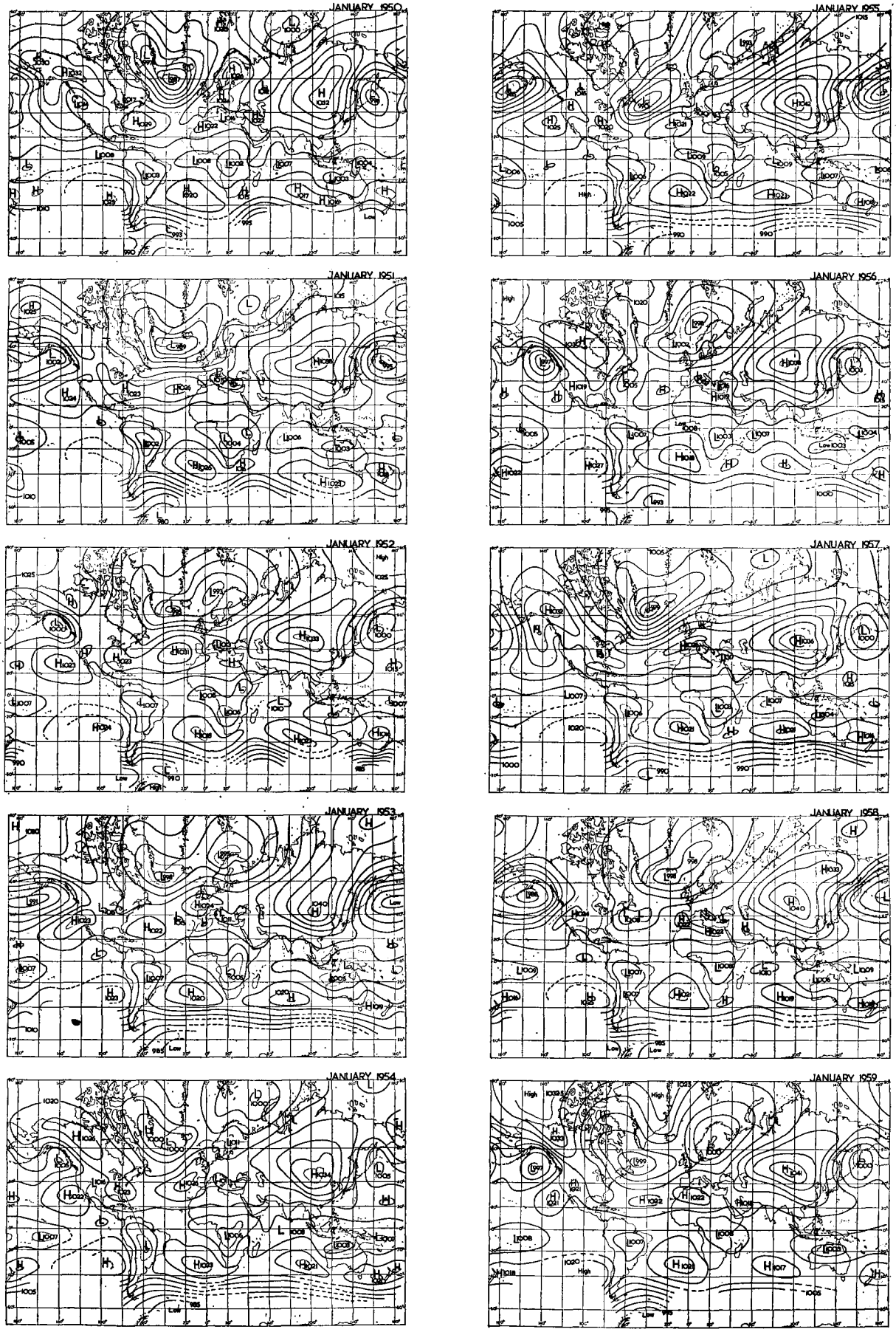

FIGURE 2—CONTINUED

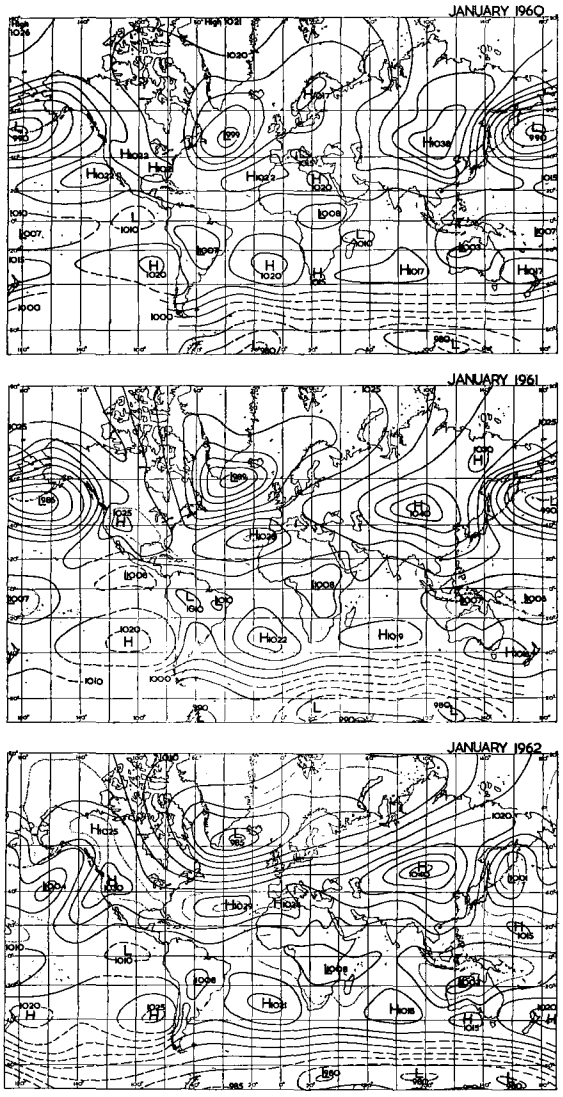

FIGURE 2—CONTINUED

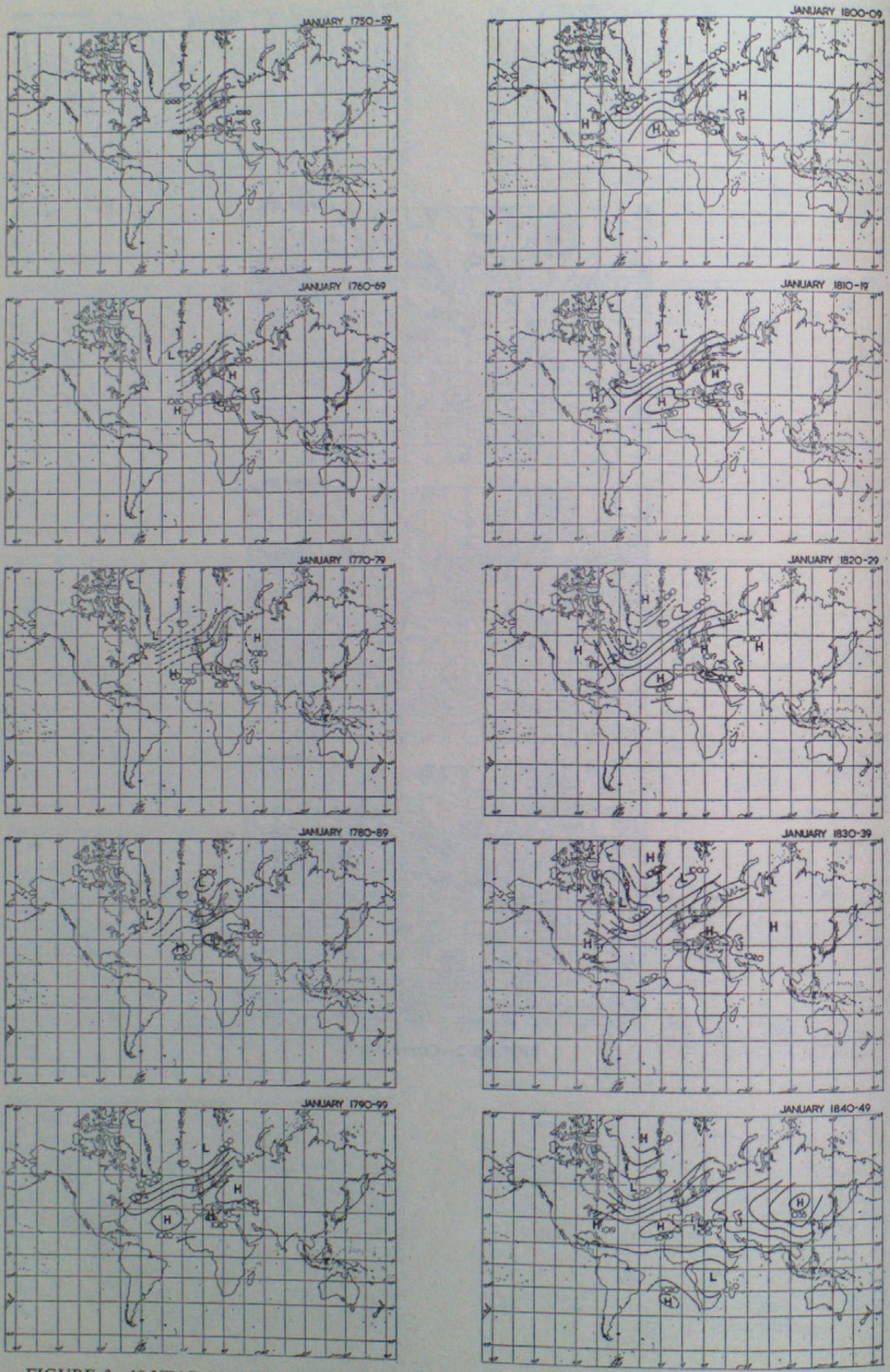

FIGURE 3—10-YEAR MEAN PRESSURE DISTRIBUTION IN JANUARY FOR EACH DECADE FROM THE 1750's

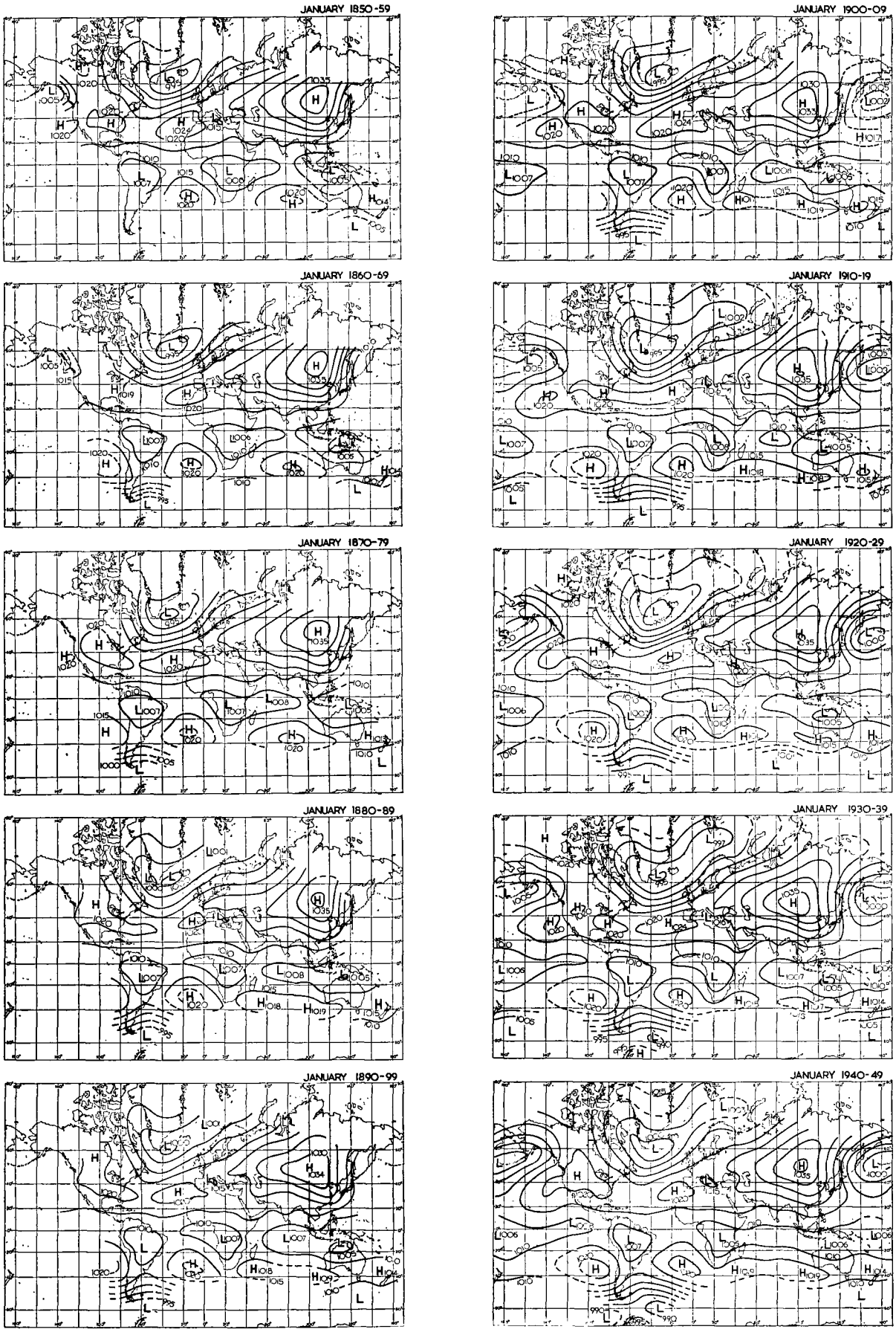

FIGURE 3—CONTINUED

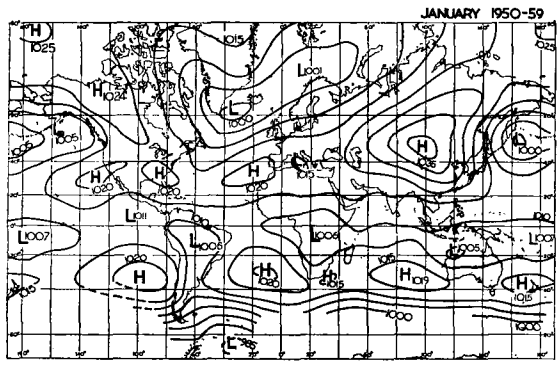

FIGURE 3—CONTINUED

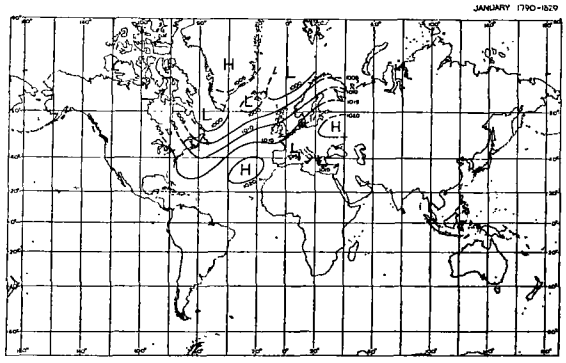

FIGURE 4(*a*)—40-YEAR MEAN PRESSURE DISTRIBUTION IN JANUARY 1790–1829

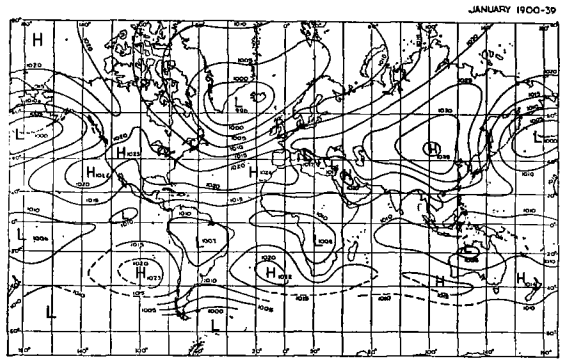

FIGURE 4(*b*)—40-YEAR MEAN PRESSURE DISTRIBUTION IN JANUARY 1900–39

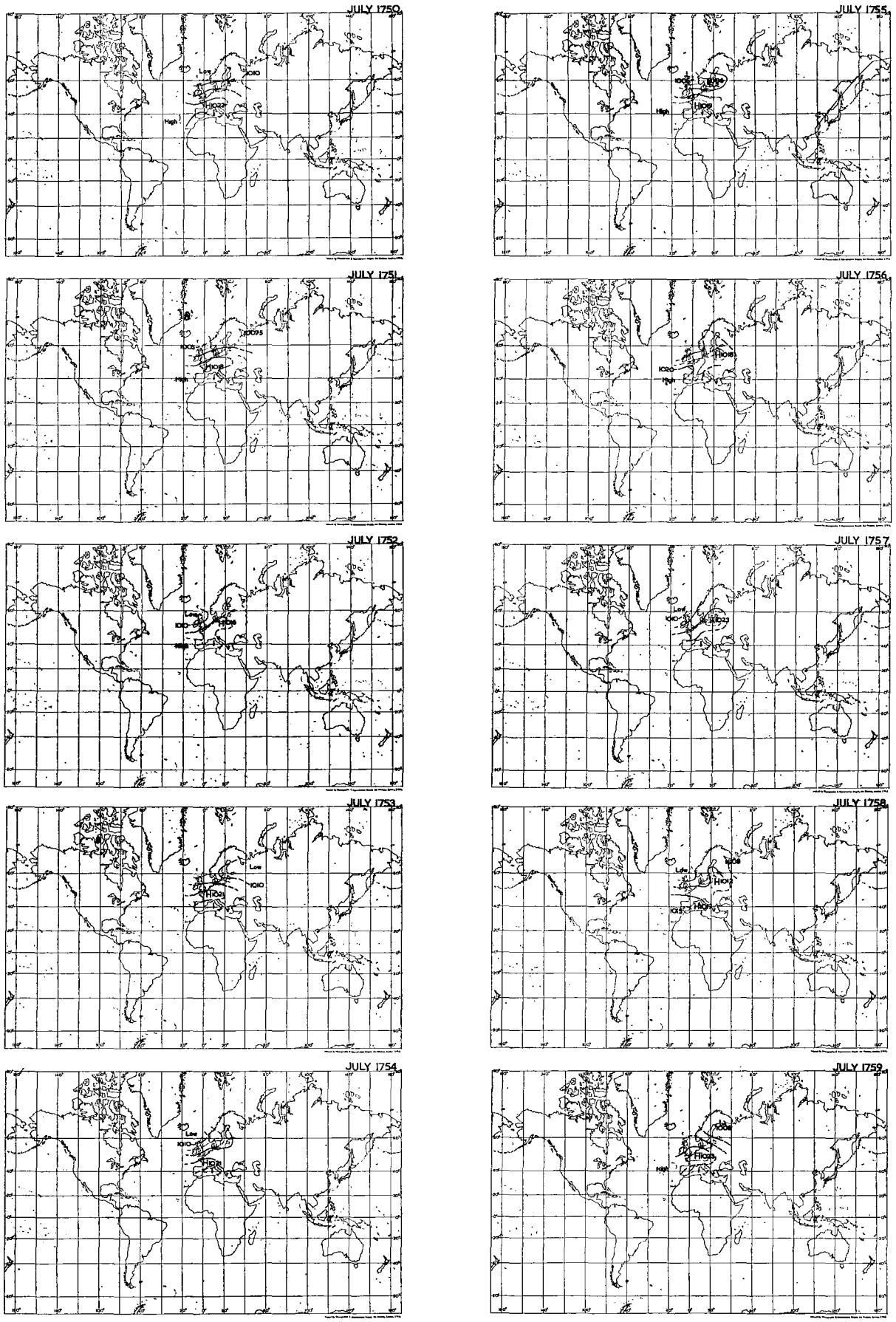

FIGURE 5—MONTHLY MEAN PRESSURE DISTRIBUTION IN JULY FOR EACH YEAR FROM 1750

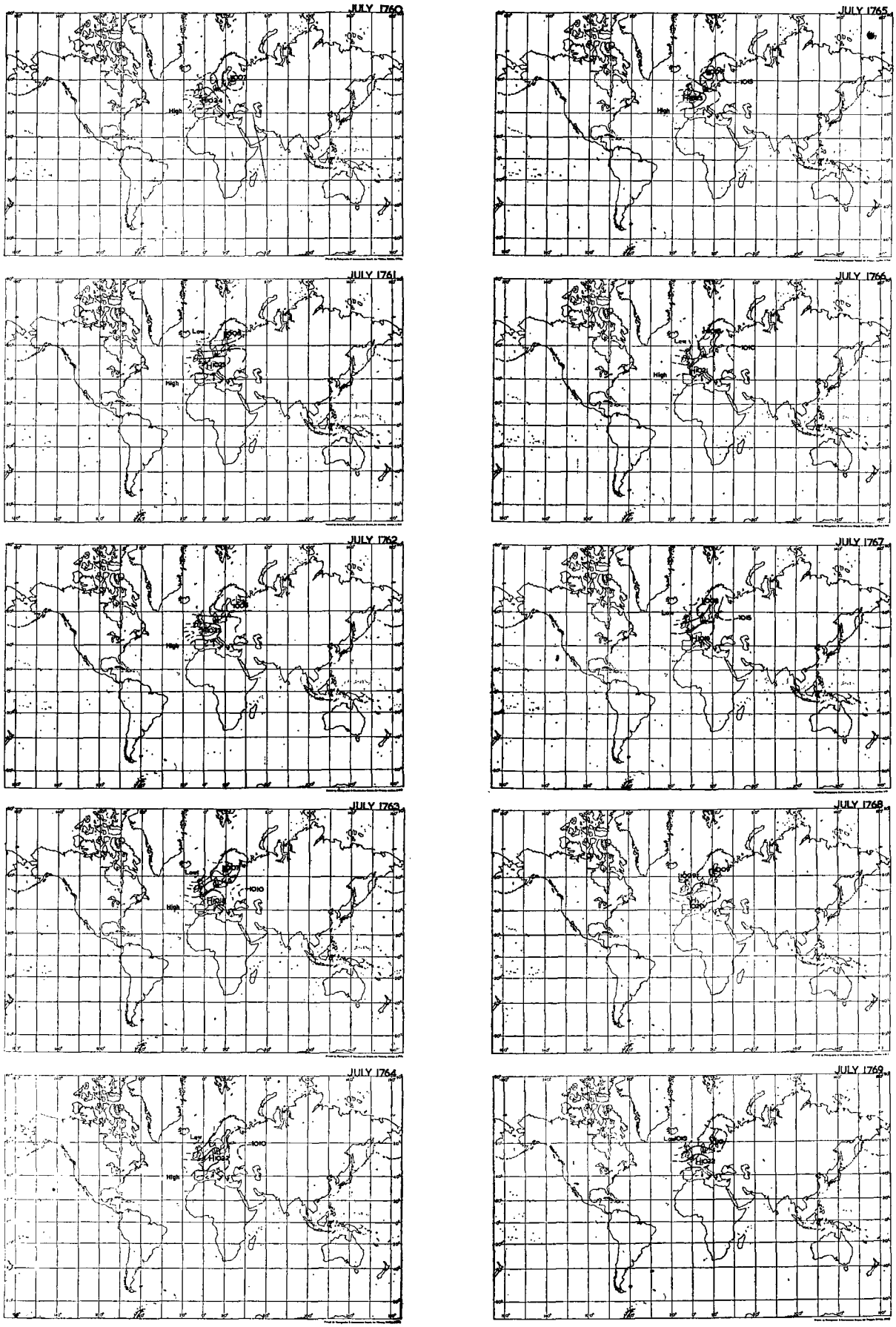

FIGURE 5—CONTINUED

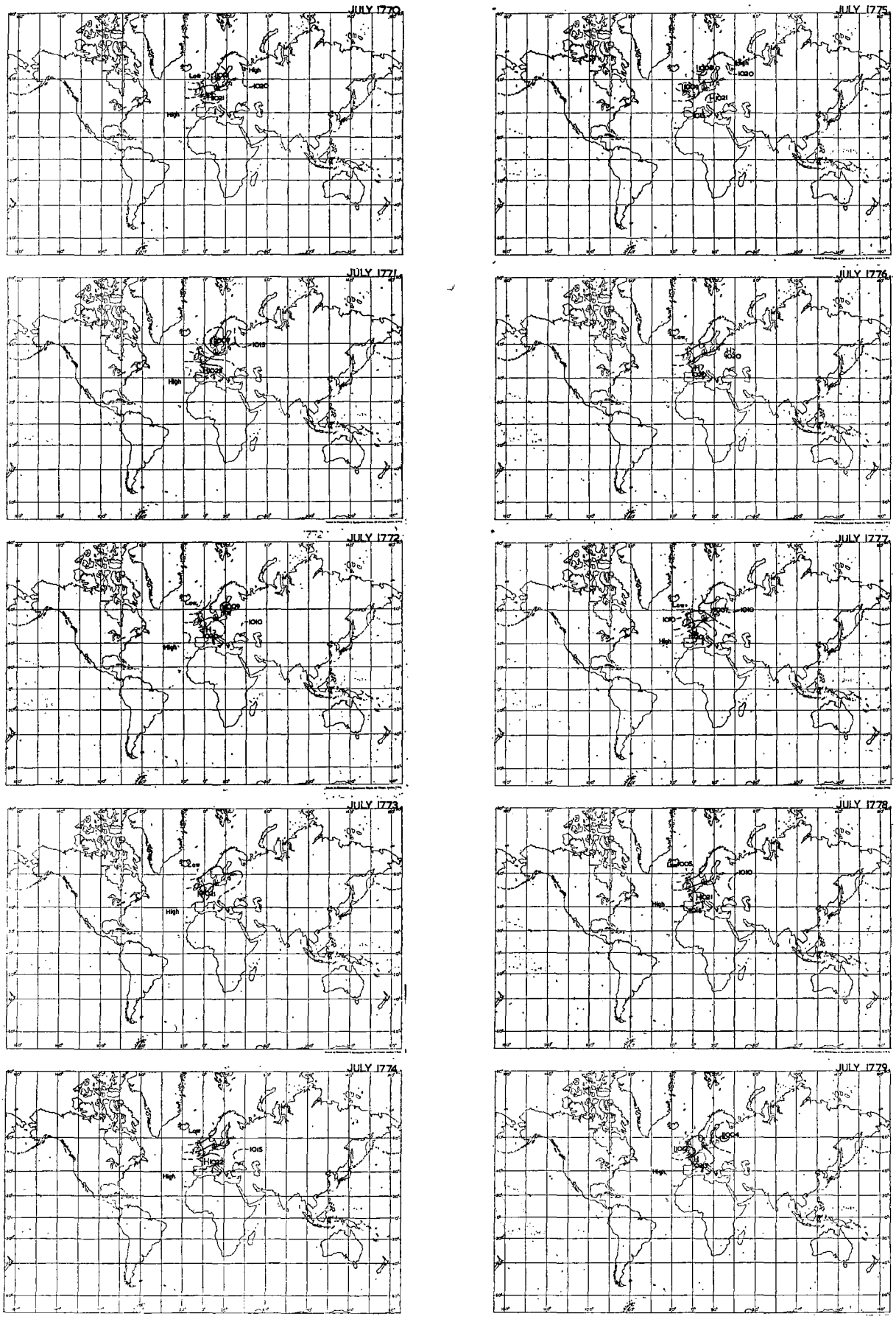

FIGURE 5—CONTINUED

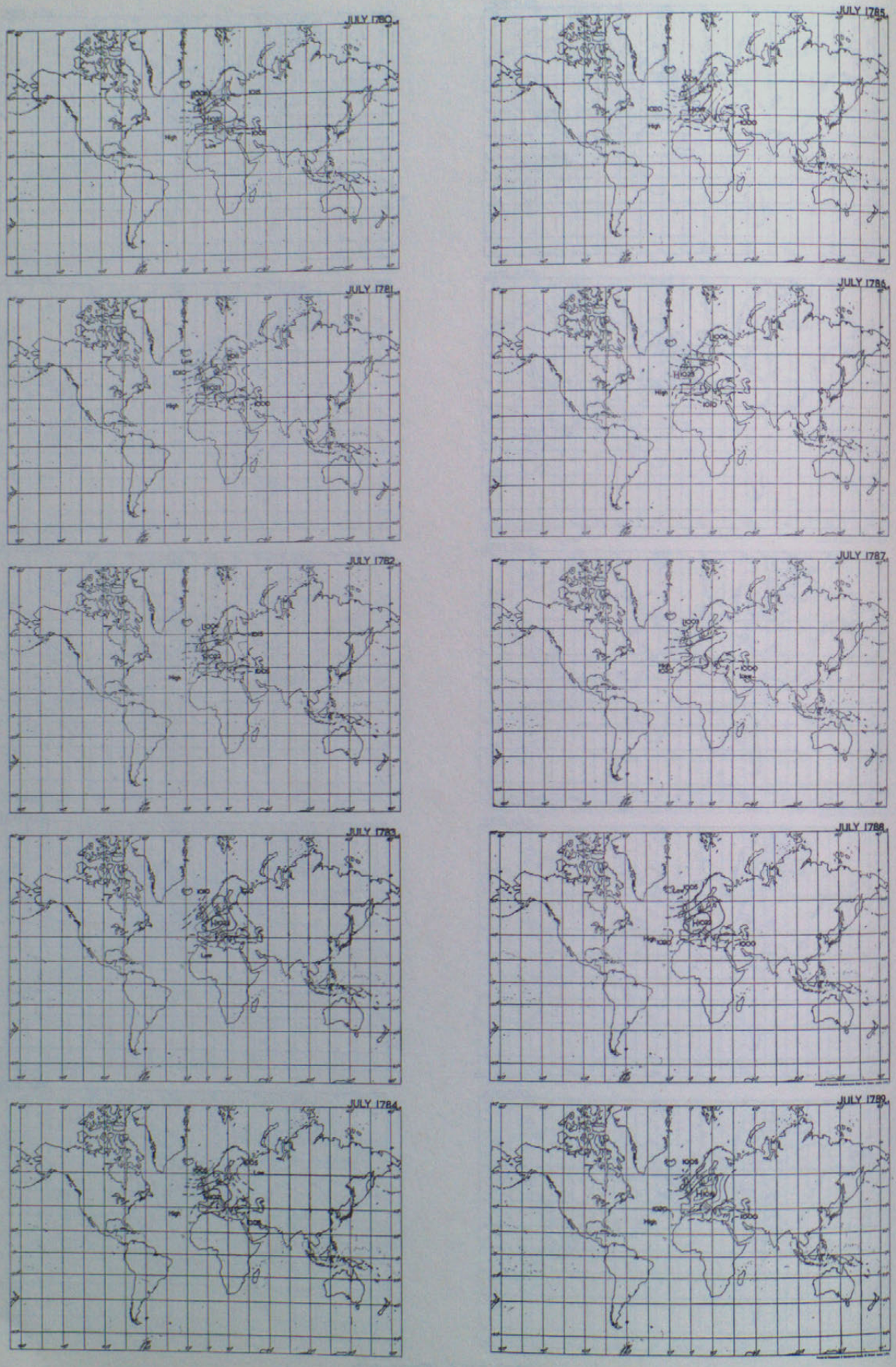

FIGURE 5—CONTINUED

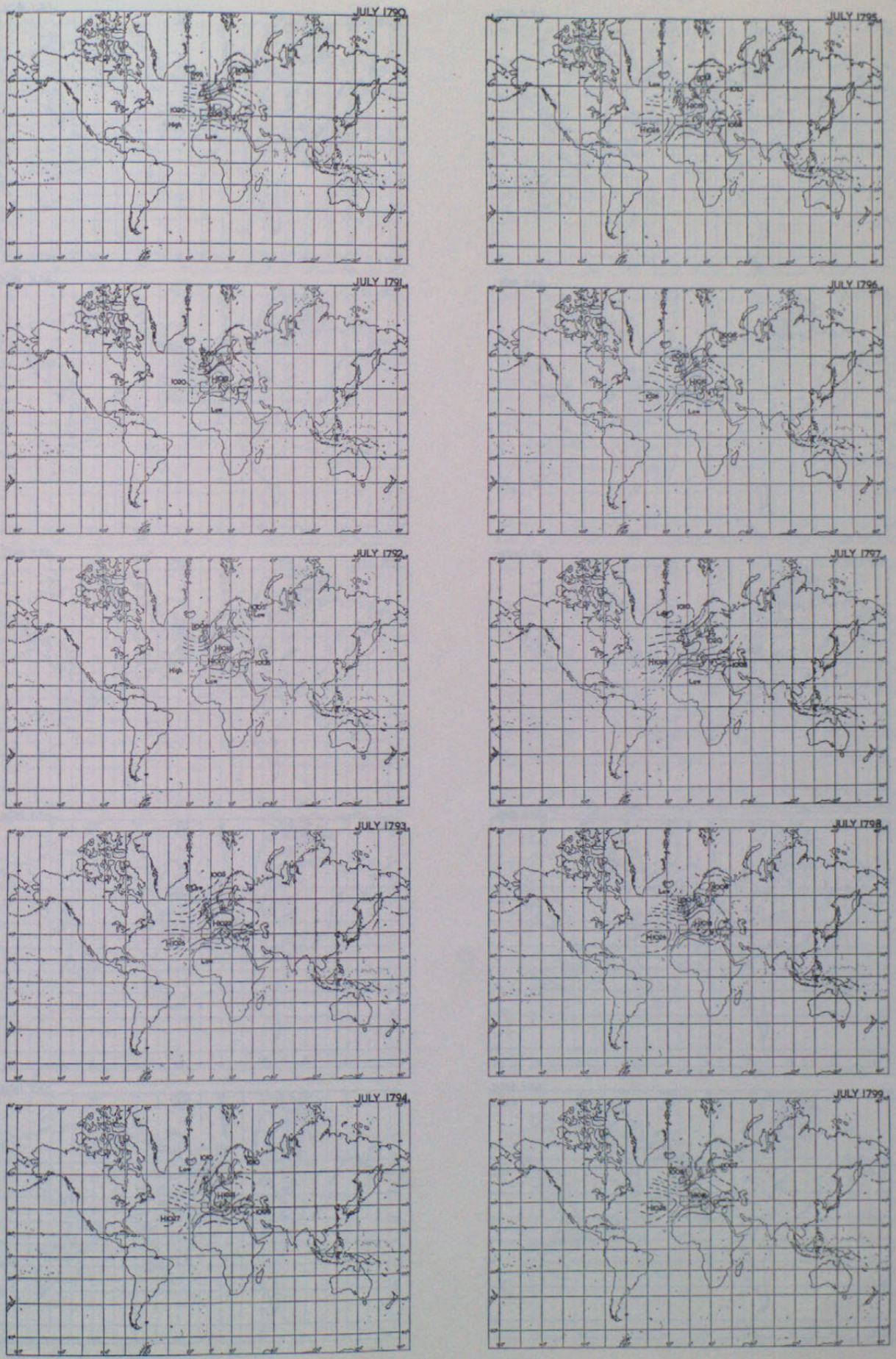

FIGURE 5—CONTINUED

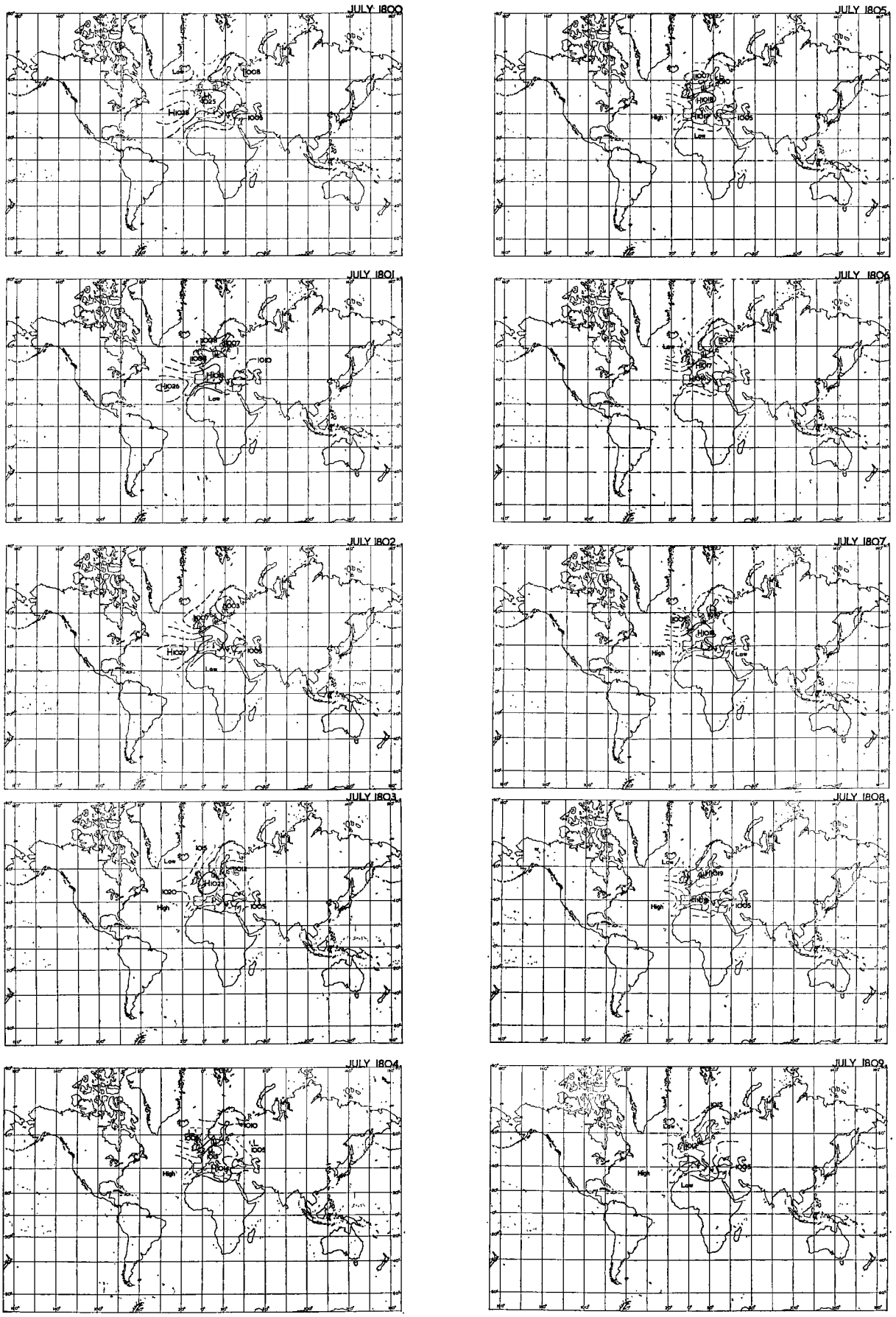

FIGURE 5—CONTINUED

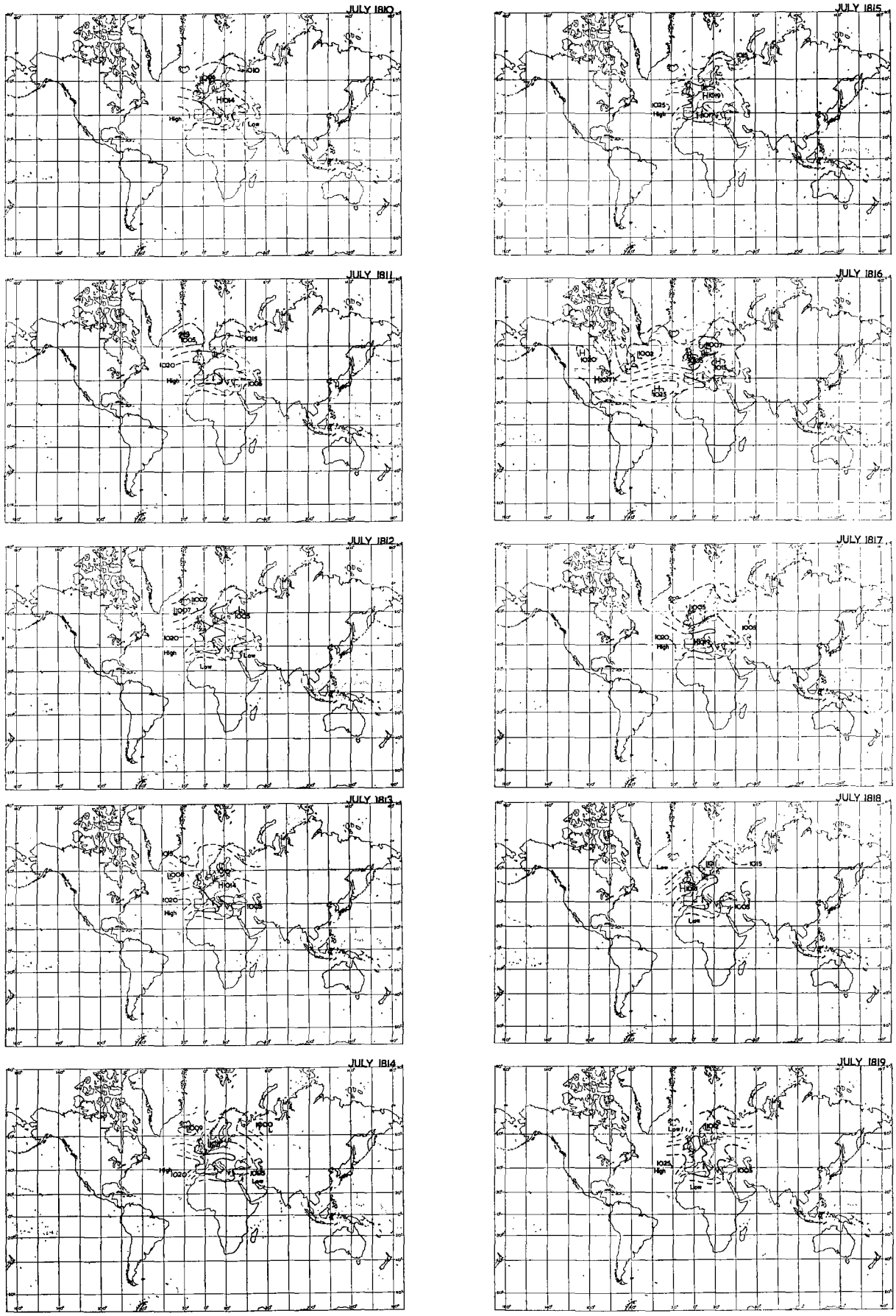

FIGURE 5—CONTINUED

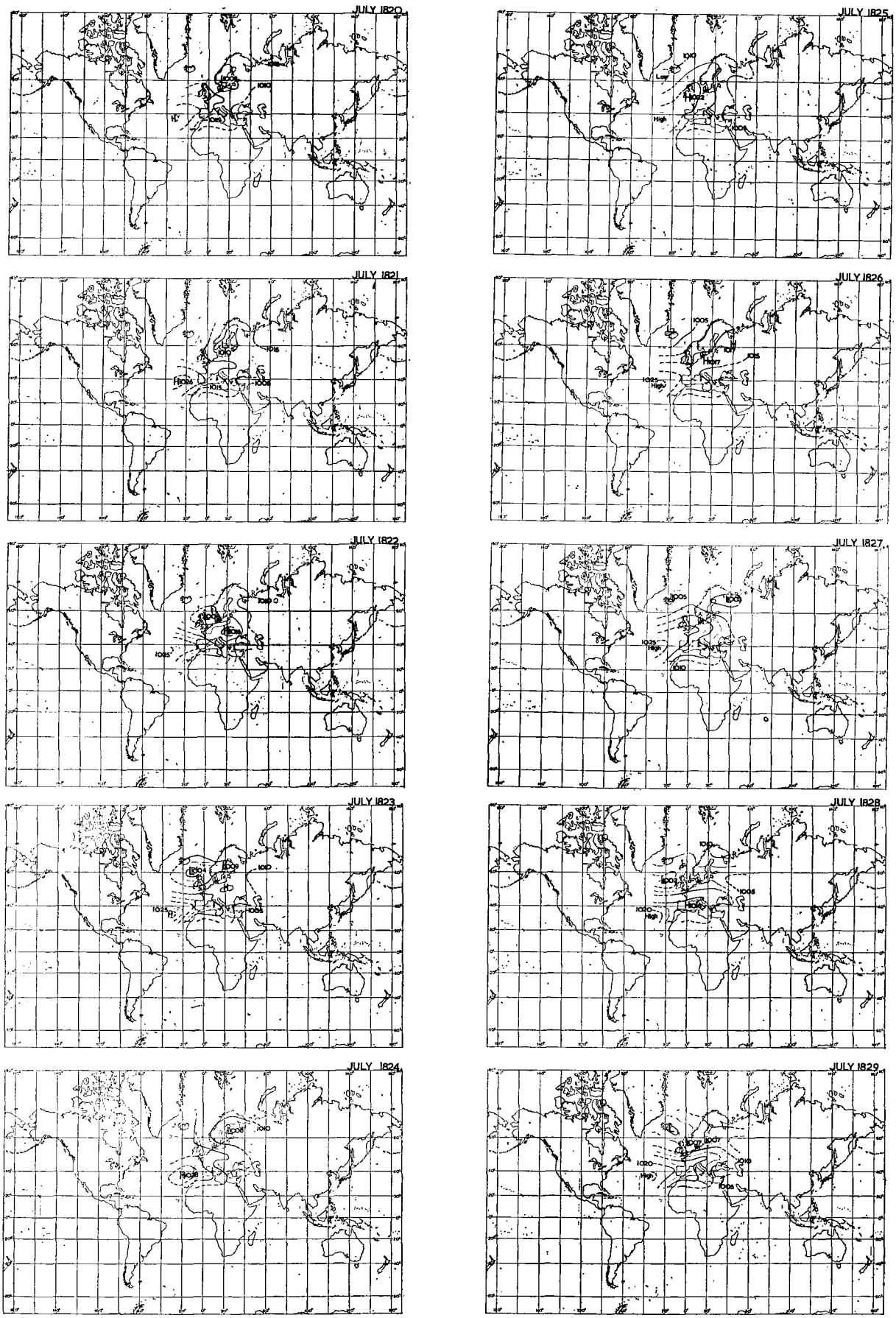

FIGURE 5—CONTINUED

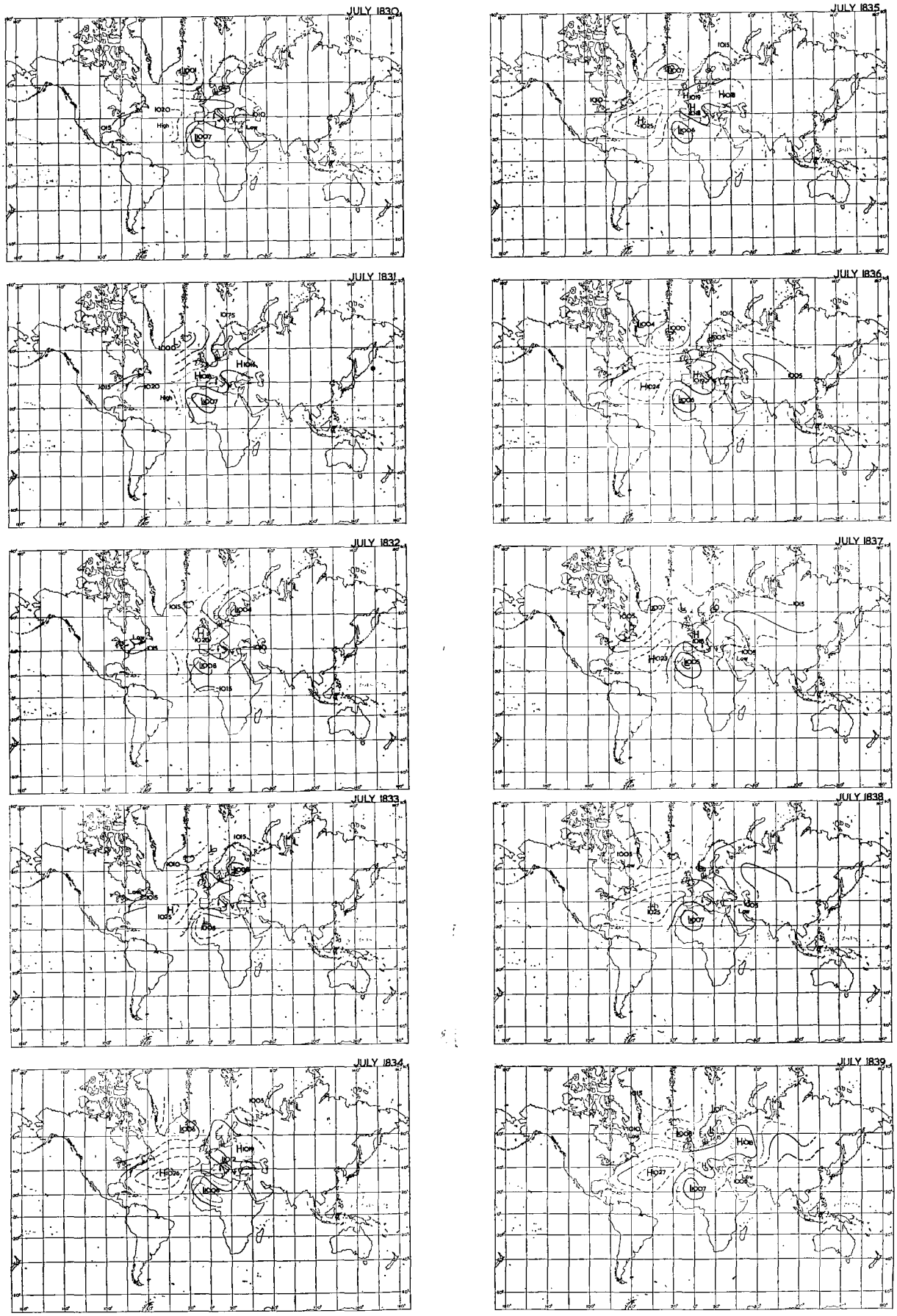

FIGURE 5—CONTINUED

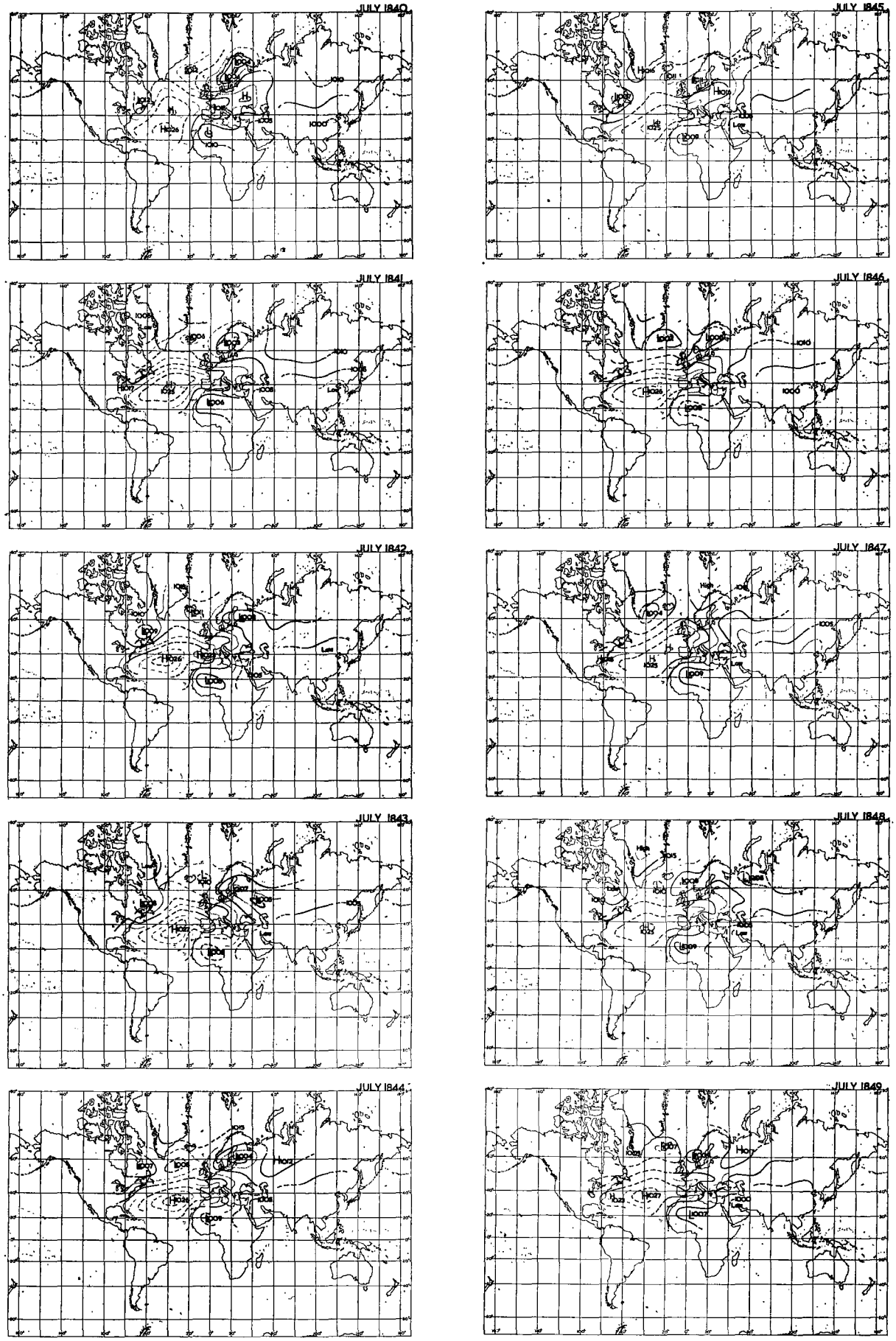

FIGURE 5—CONTINUED

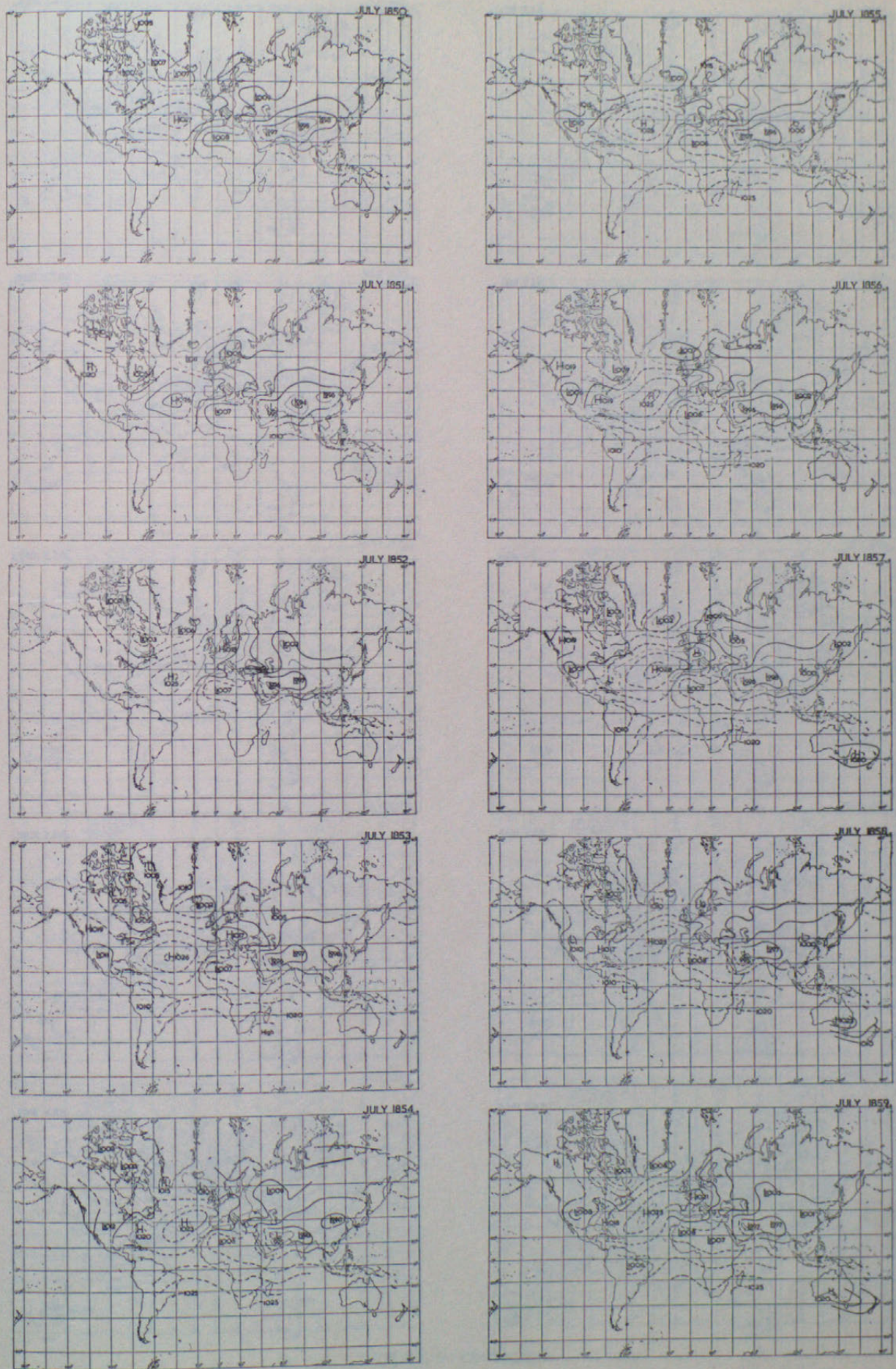

FIGURE 5—CONTINUED

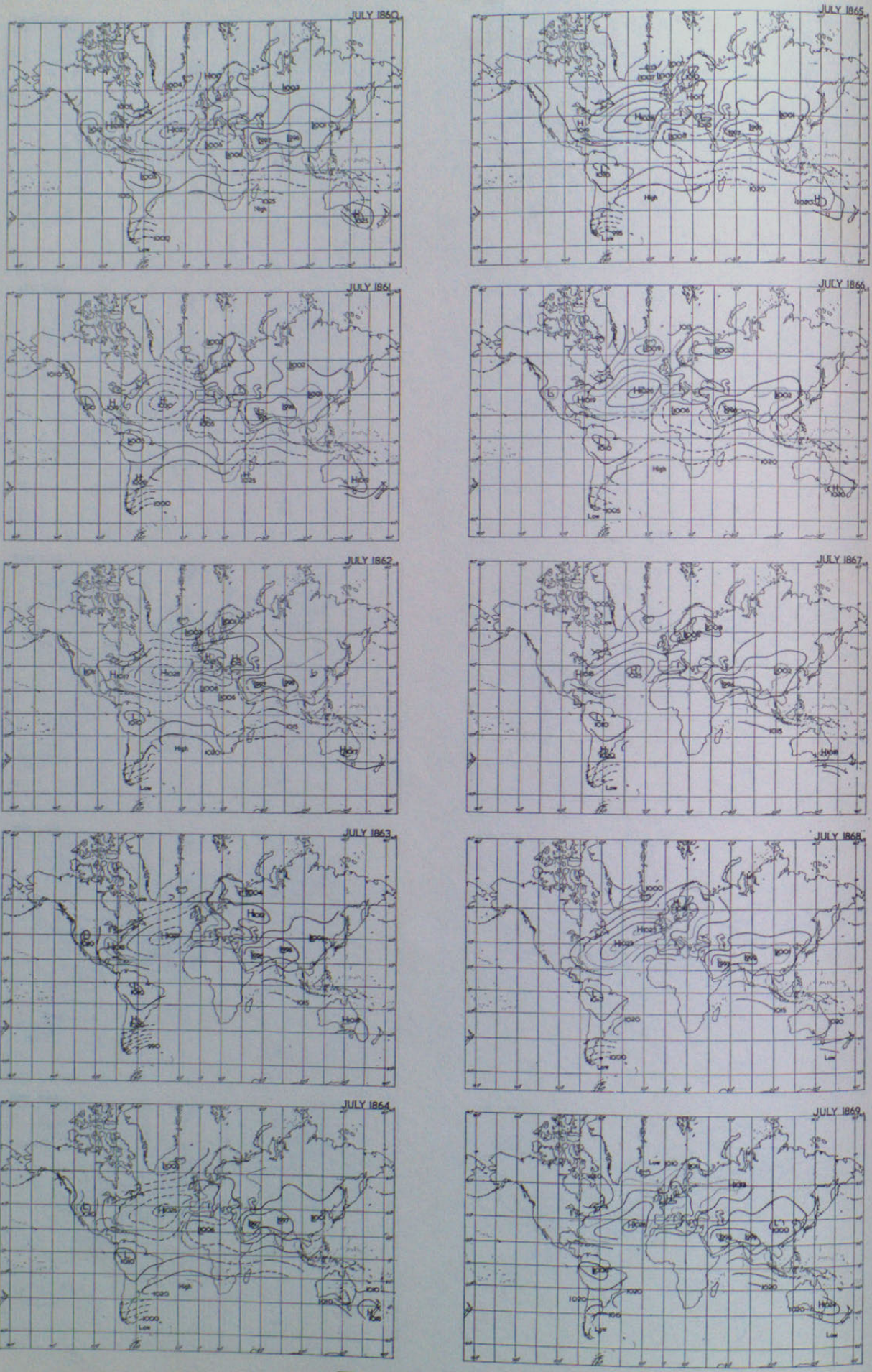

FIGURE 5—CONTINUED

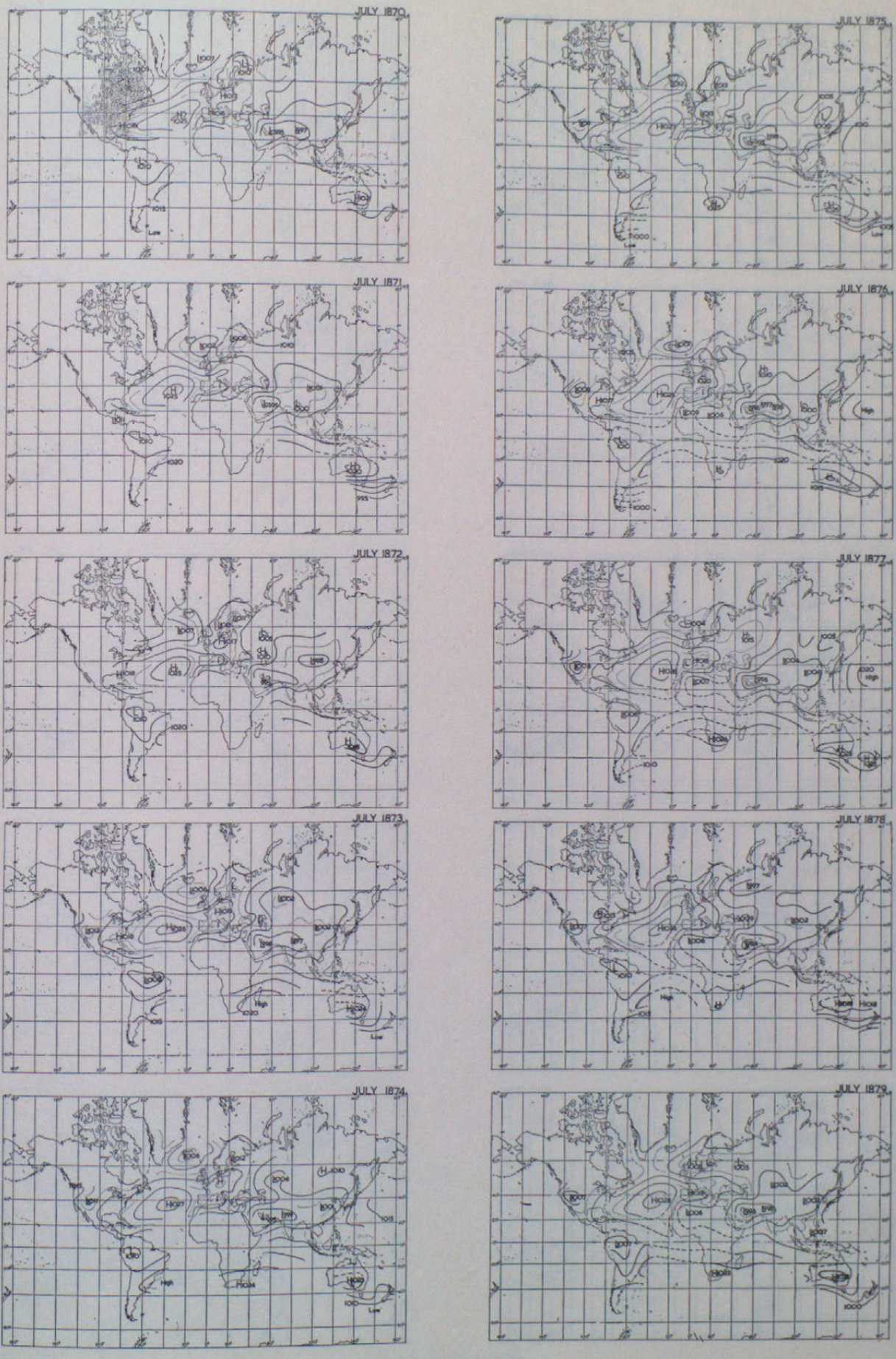

FIGURE 5—CONTINUED

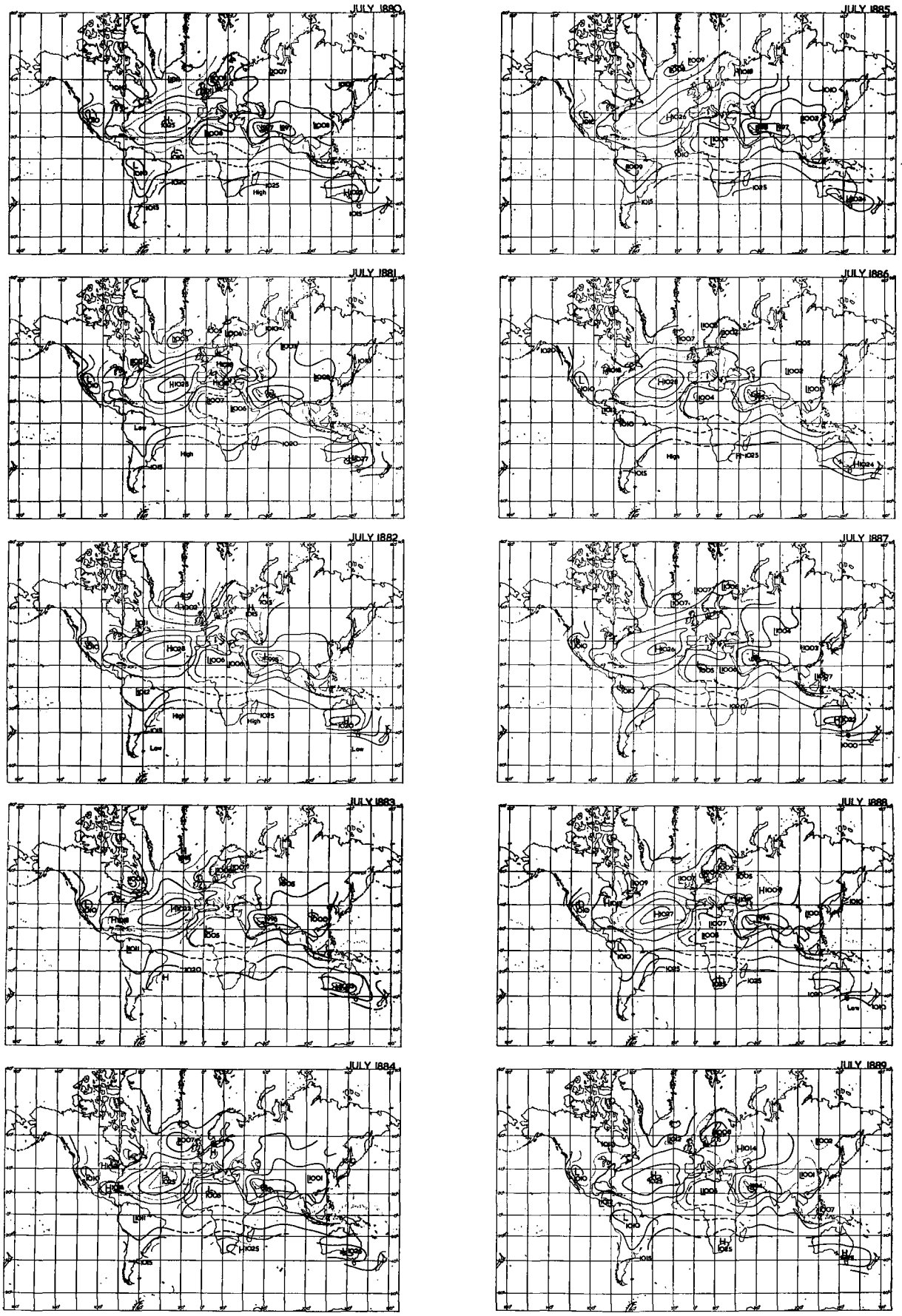

FIGURE 5—CONTINUED

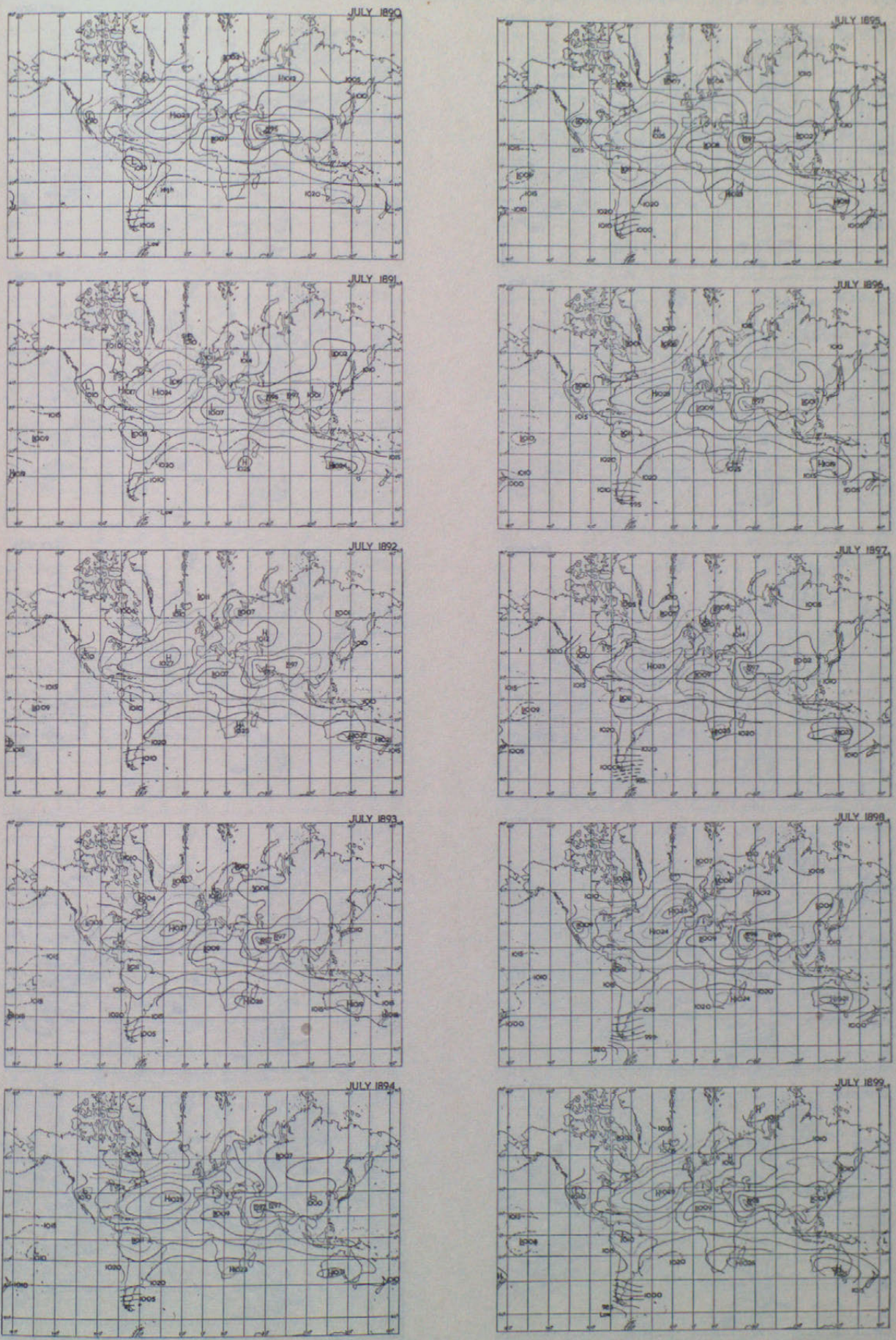

FIGURE 5—CONTINUED

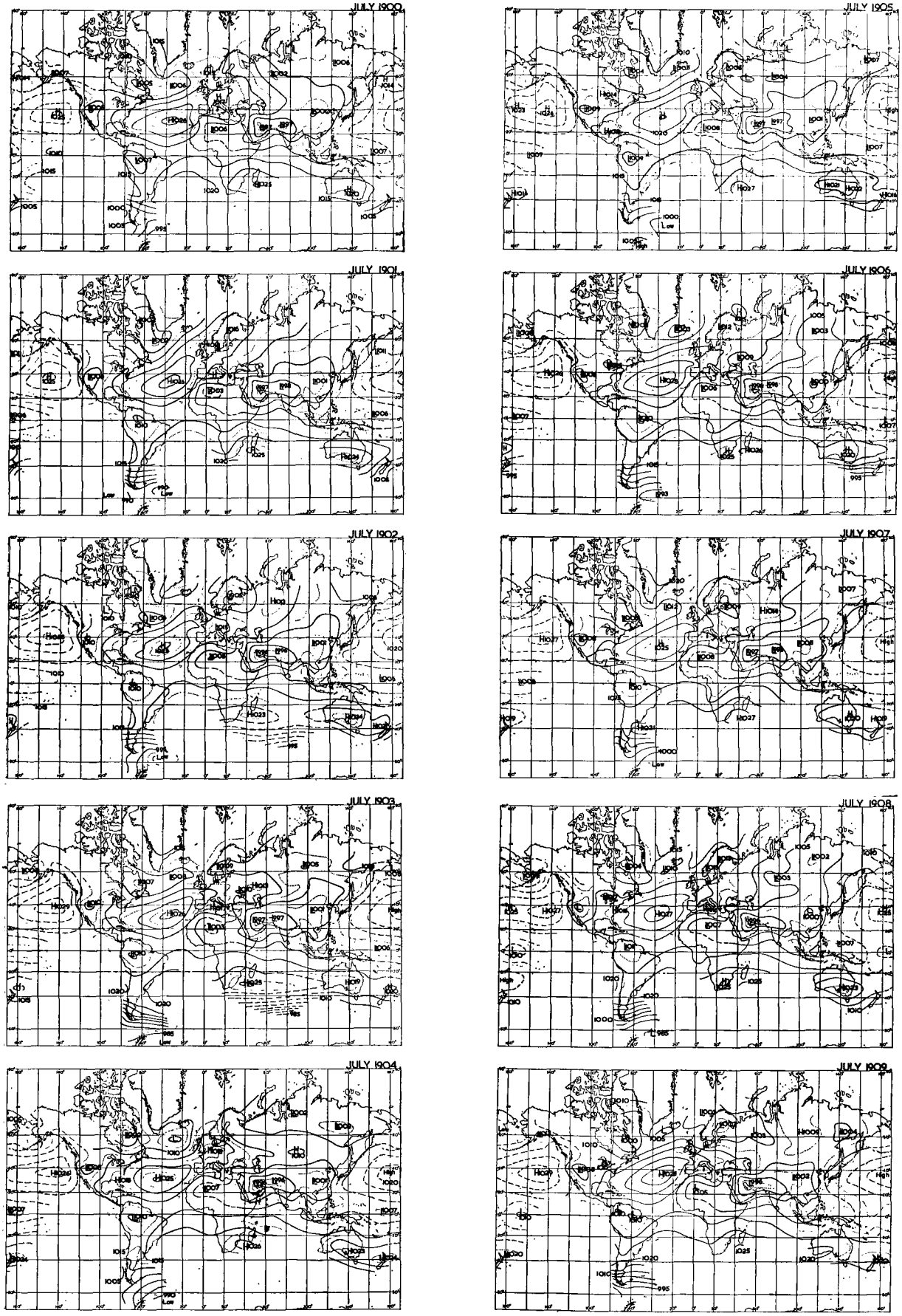

FIGURE 5—CONTINUED

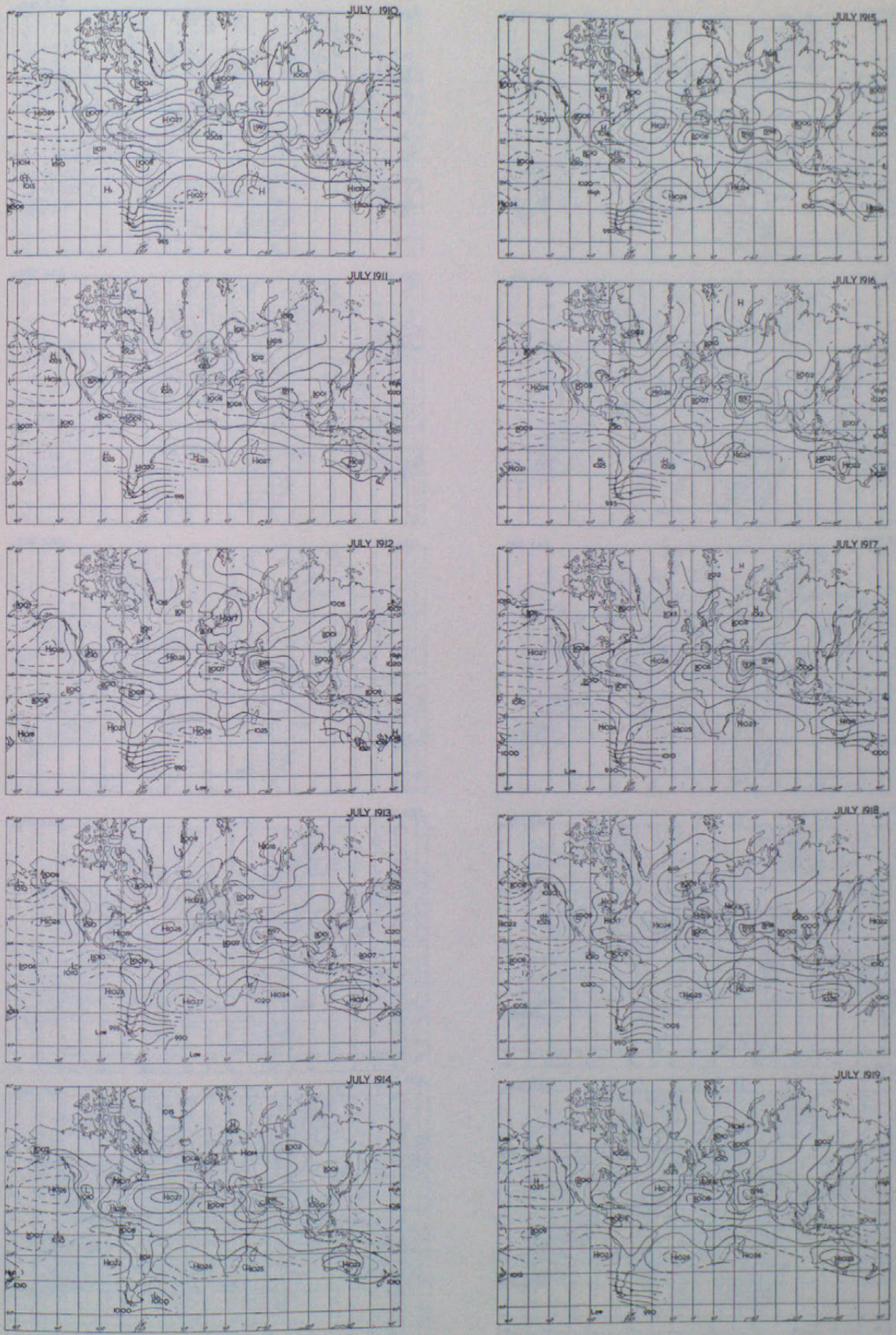

FIGURE 5—CONTINUED

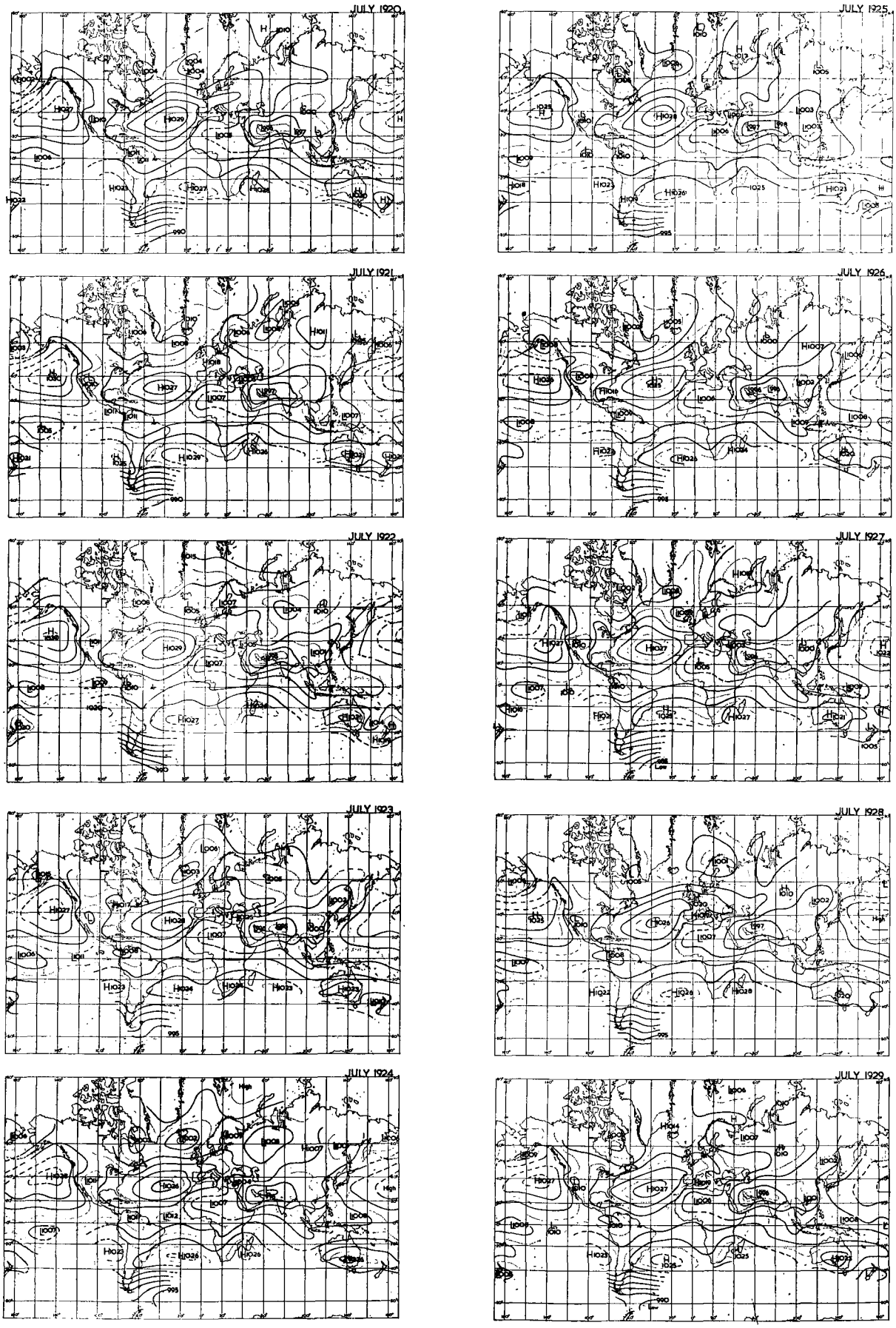

FIGURE 5—CONTINUED

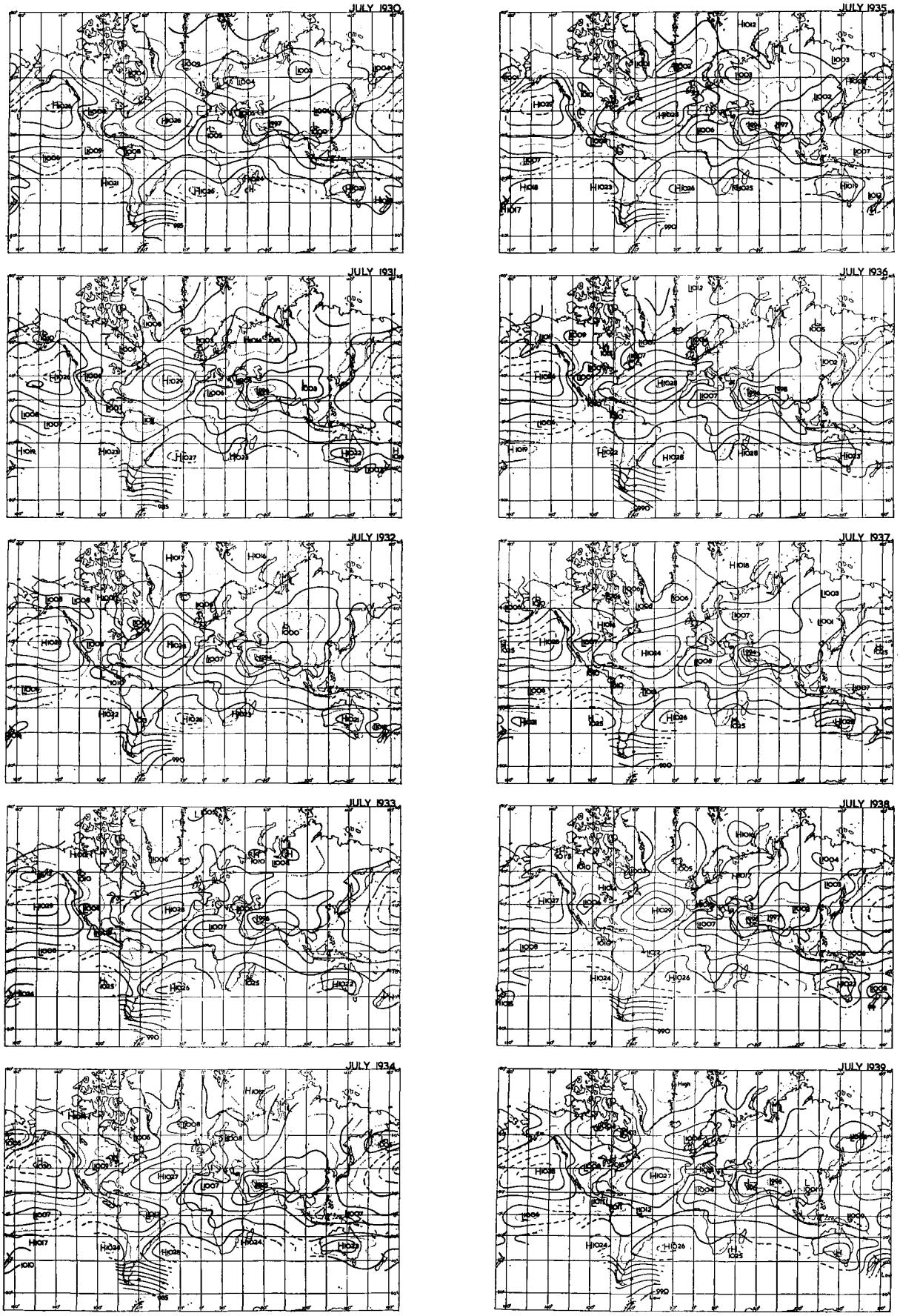

FIGURE 5—CONTINUED

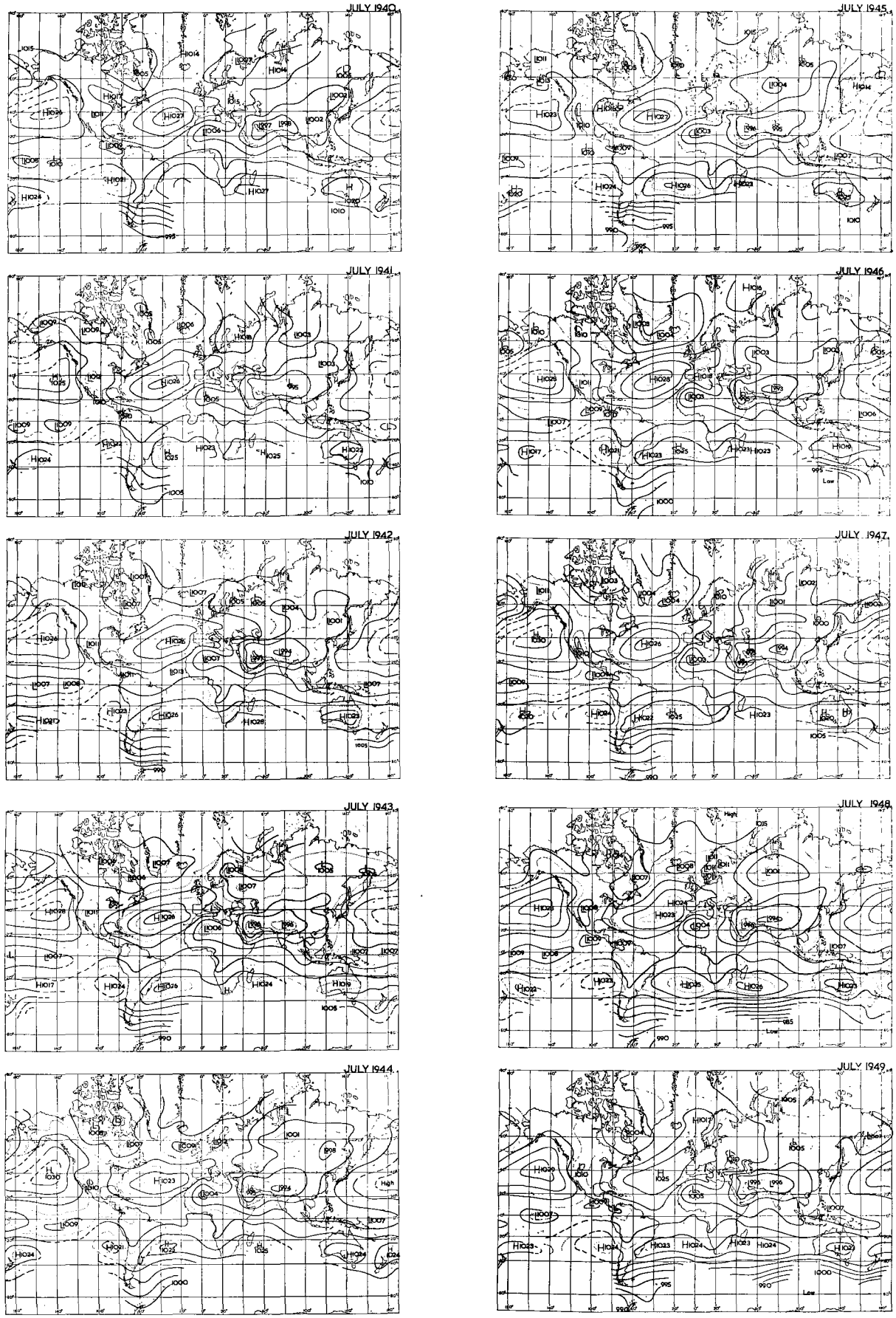

FIGURE 5—CONTINUED

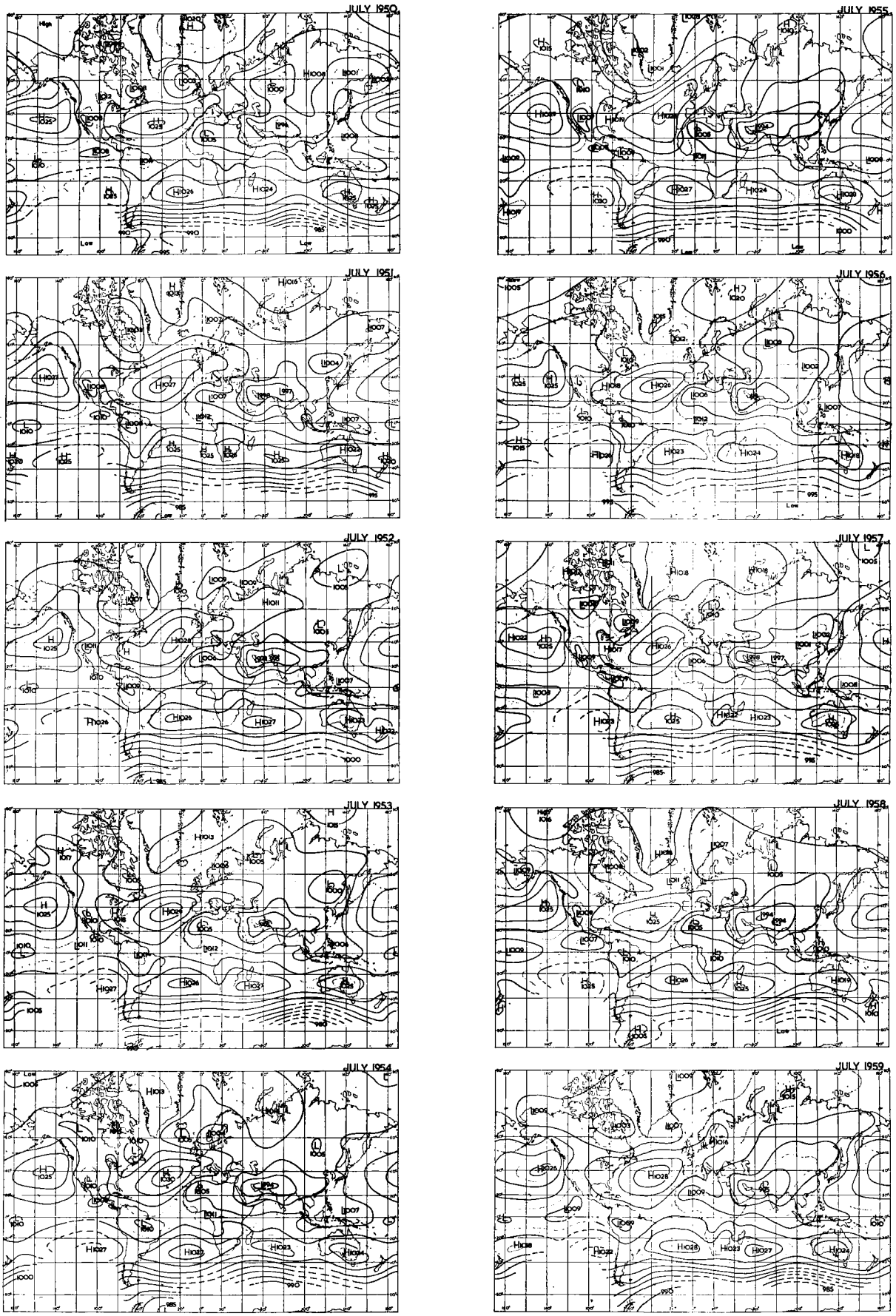

FIGURE 5—CONTINUED

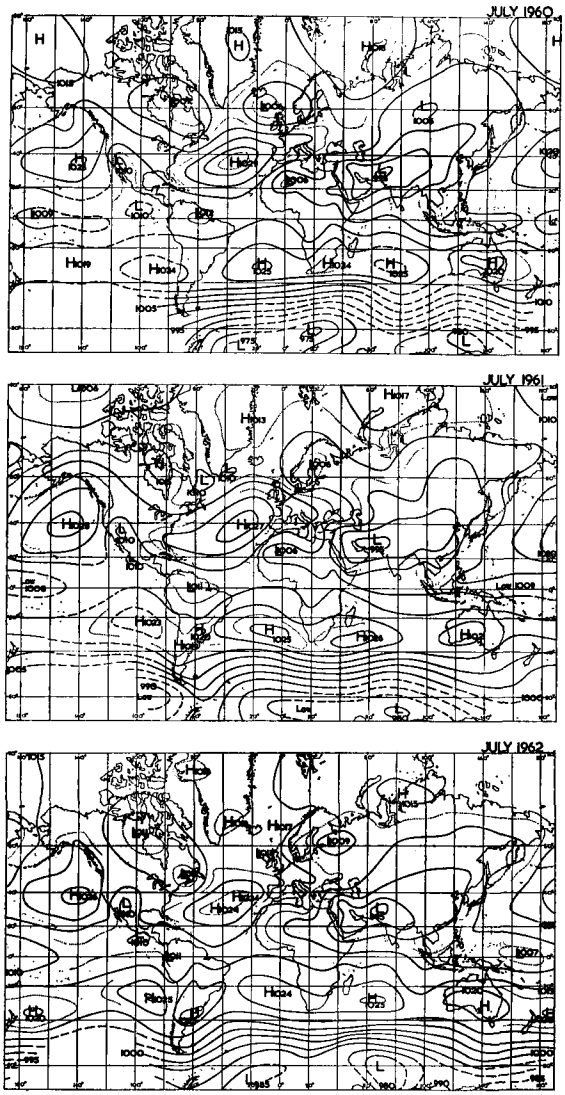

FIGURE 5—CONTINUED

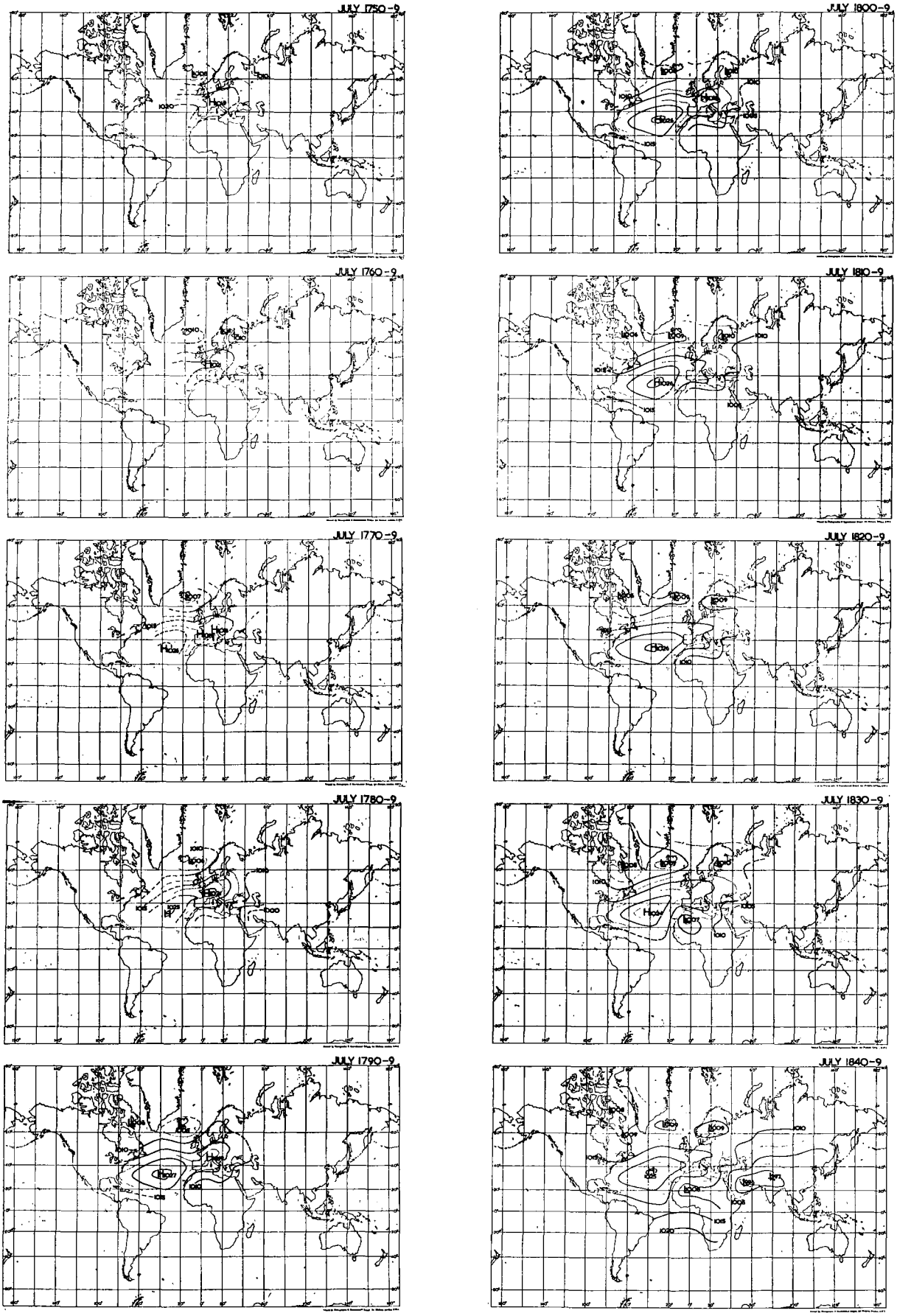

FIGURE 6—10-YEAR MEAN PRESSURE DISTRIBUTION IN JULY FOR EACH DECADE FROM THE 1750's

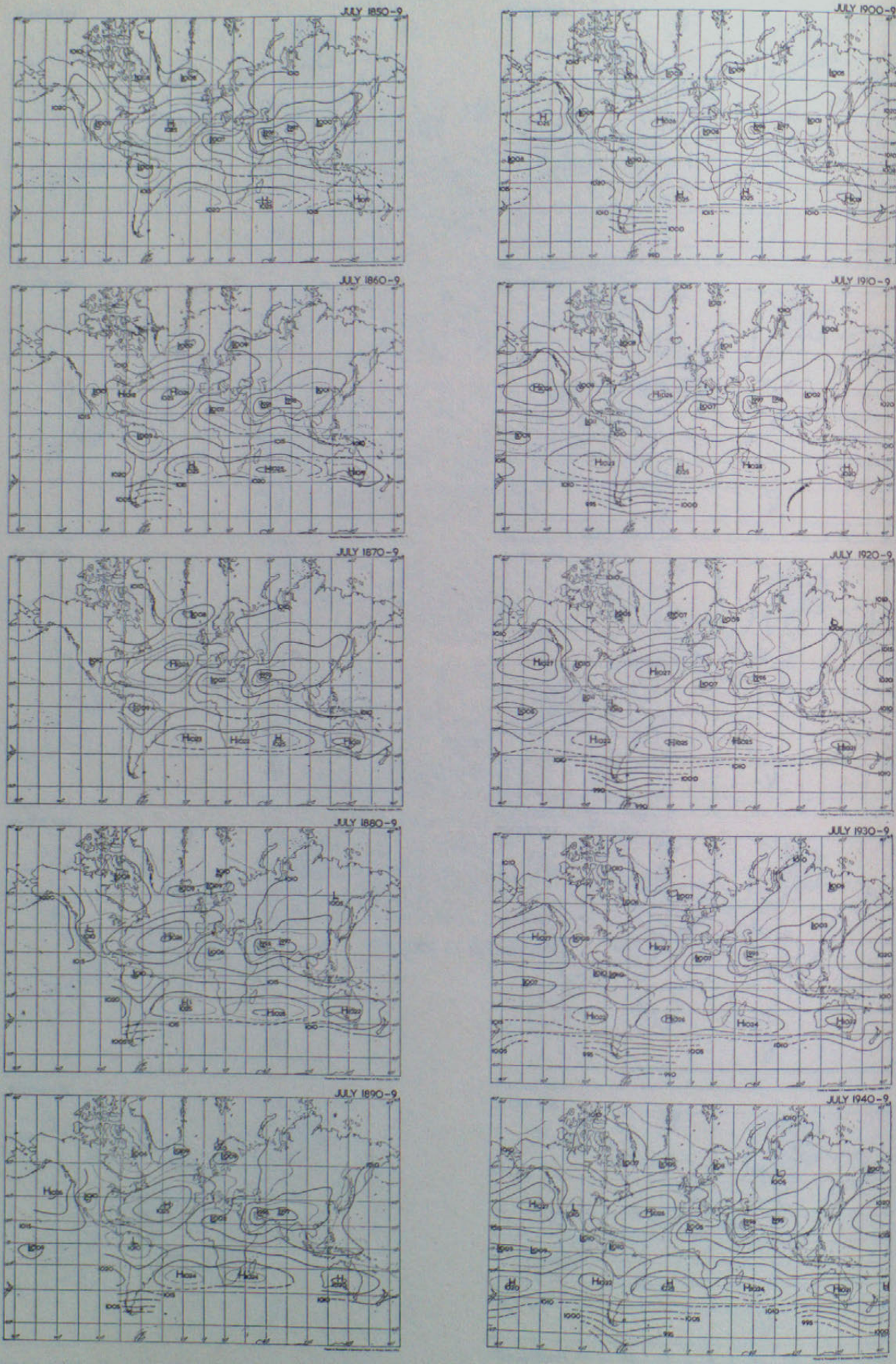

FIGURE 6—CONTINUED

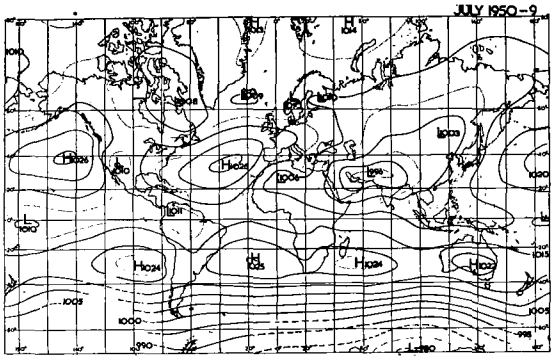

FIGURE 6—CONTINUED

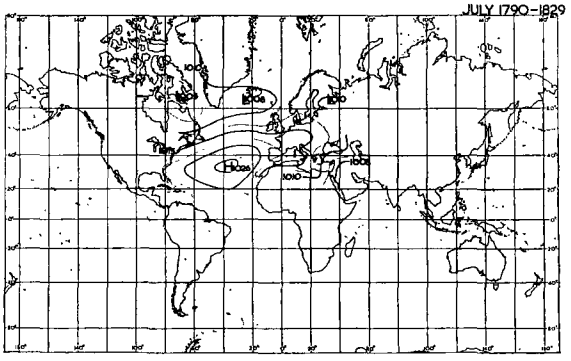

FIGURE 7(*a*)—40-YEAR MEAN PRESSURE DISTRIBUTION IN JULY 1790–1829

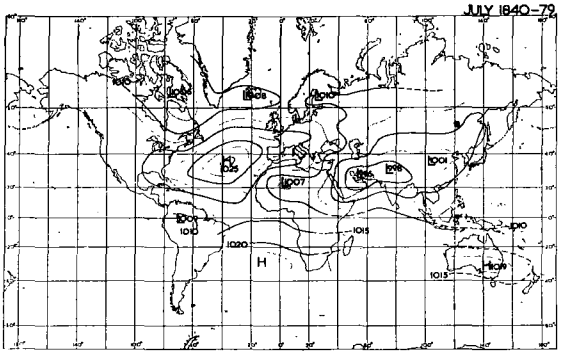

FIGURE 7(*b*)—40-YEAR MEAN PRESSURE DISTRIBUTION IN JULY 1840–79

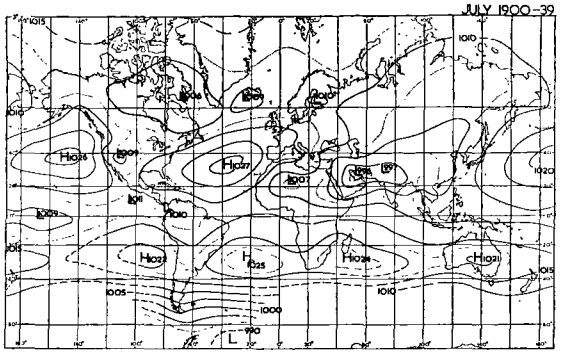

FIGURE 7(*c*)—40-YEAR MEAN PRESSURE DISTRIBUTION IN JULY 1900–39

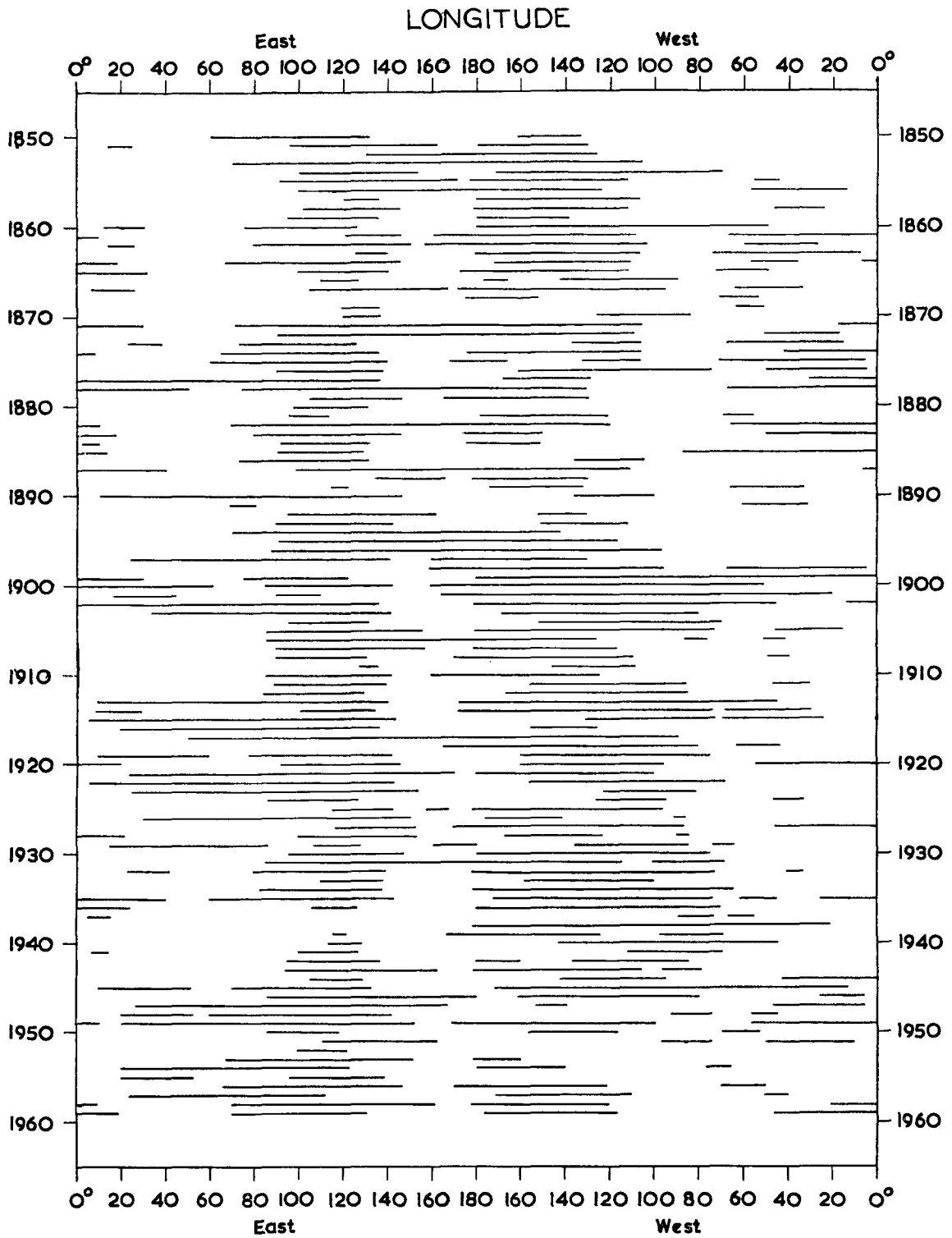

FIGURE 8—TROUGHS IN LATITUDE 45°s EACH JULY SINCE 1850: LONGITUDE RANGES WITH AVERAGE PRESSURE FOR JULY LESS THAN 1010 MB

TABLE I(*a*)—NORTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JANUARY, 10-YEAR MEAN VALUES, MB

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1786–95	*28·9*	*7·2*	9·5	—	—	2·4	1786–95
1787–96	*29·7*	*7·3*	10·0	—	—	3·2	1787–96
1788–97	*30·2*	*7·5*	10·3	—	—	3·6	1788–97
1789–98	*31·9*	*8·4*	10·9	—	—	3·8	1789–98
1790–99	*32·8*	*9·0*	10·7	—	—	3·8	1790–99
1791–1800	*32·3*	*9·2*	9·1	—	—	3·8	1791–1800
1792–1801	*31·9*	*8·5*	8·8	—	—	3·3	1792–1801
1793–1802	*32·0*	*8·5*	9·4	—	—	4·1	1793–1802
1794–1803	*30·8*	*8·0*	7·7	—	—	4·5	1794–1803
1795–1804	*31·3*	*8·0*	7·2	—	—	4·9	1795–1804
1796–1805	*31·5*	*8·0*	7·2	—	—	5·4	1796–1805
1797–1806	*32·1*	*8·7*	7·4	—	—	4·9	1797–1806
1798–1807	*31·2*	*8·8*	7·2	—	—	4·9	1798–1807
1799–1808	*30·5*	*8·8*	7·3	—	—	5·0	1799–1808
1800–09	*30·6*	*8·7*	6·1	—	—	4·9	1800–09
1801–10	*31·1*	*8·9*	7·1	—	—	4·9	1801–10
1802–11	*30·5*	*9·1*	6·2	—	—	5·0	1802–11
1803–12	*30·9*	*9·4*	6·2	—	—	4·7	1803–12
1804–13	*32·1*	*9·9*	7·5	—	—	4·5	1804–13
1805–14	*32·1*	*10·1*	6·5	—	—	4·1	1805–14
1806–15	*32·5*	*10·7*	6·9	—	—	4·1	1806–15
1807–16	*31·1*	*10·0*	6·2	—	—	3·9	1807–16
1808–17	*32·5*	*10·8*	6·7	—	—	4·0	1808–17
1809–18	*34·0*	*11·2*	7·3	—	—	4·1	1809–18
1810–19	*35·3*	*12·0*	9·2	—	—	4·3	1810–19
1811–20	*34·5*	*11·6*	8·6	—	—	4·2	1811–20
1812–21	*34·5*	*11·2*	8·5	—	—	4·3	1812–21
1813–22	*35·1*	*10·9*	8·8	—	—	3·5	1813–22
1814–23	*34·1*	*11·0*	7·5	—	—	3·2	1814–23
1815–24	*35·7*	*11·2*	9·3	—	—	3·1	1815–24
1816–25	*37·1*	*11·1*	10·4	—	—	2·4	1816–25
1817–26	*37·2*	*11·5*	9·9	—	—	2·2	1817–26
1818–27	*36·7*	*10·9*	9·1	—	—	1·7	1819–27
1819–28	*36·0*	*10·7*	7·4	—	—	1·7	1819–28

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE I(*a*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest—lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max.—Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1820–29	34·3	10·4	5·5 ✓	—	—	1·3	1820–29
1821–30	33·5	10·0	5·1	—	—	0·7	1821–30
1822–31	32·6	10·0	4·7	—	—	0·3	1822–31
1823–32	31·1	10·4	4·3	—	—	0·9	1823–32
1824–33	31·6	10·0	5·2	—	—	0·8	1824–33
1825–34	30·8	10·6	4·9	—	—	1·2	1825–34
1826–35	29·6	10·0	4·8	—	—	1·3	1826–35
1827–36	29·9	9·4	5·6	—	—	1·0	1827–36
1828–37	27·9	9·5	5·3	—	—	1·0	1828–37
1829–38	26·7	8·5	4·3	—	—	0·9	1829–38
1830–39	27·9	7·7	6·5 ✓	—	—	0·1	1830–39
1831–40	29·1	8·7	8·4	—	—	1·0	1831–40
1832–41	29·2	8·8	8·6	—	—	0·8	1832–41
1833–42	30·3	8·9	8·1	—	—	1·2	1833–42
1834–43	30·8	9·3	9·3	—	—	1·3	1834–43
1835–44	30·0	8·8	9·0	—	—	0·3	1835–44
1836–45	29·6	9·6	8·2	—	40·0	0·9	1836–45
1837–46	30·0	10·5	8·0	—	40·8	1·6	1837–46
1838–47	32·3	10·8	7·2	—	40·9	2·3	1838–47
1839–48	32·3	11·3	7·8	—	42·0	2·5	1839–48
1840–49	31·7	11·7	7·3 ✓	—	41·4	3·3	1840–49
1841–50	31·6	11·8	5·9	—	40·5	2·9	1841–50
1842–51	34·4	12·7	7·4	—	41·6	4·0	1842–51
1843–52	35·3	12·9	9·3	—	41·7	4·2	1843–52
1844–53	35·8	12·8	8·8	—	42·2	4·5	1844–53
1845–54	36·5	12·9	8·7	—	42·1	5·6	1845–54
1846–55	34·9	11·6	8·5	4·9	41·5	4·8	1846–55
1847–56	33·8	10·8	7·8	5·1	41·5	4·7	1847–56
1848–57	33·2	10·7	8·5	5·2	40·3	4·3	1848–57
1849–58	33·2	10·4	9·8	5·1	39·2	3·8	1849–58
1850–59	34·0	10·2	10·4 ✓	5·9	38·8	3·9	1850–59
1851–60	34·7	10·3	11·2	6·2	40·1	4·3	1851–60
1852–61	32·8	9·6	10·0	6·7	39·3	3·5	1852–61
1853–62	31·7	9·1	8·5	7·4	39·6	3·1	1853–62
1854–63	31·6	9·6	9·2	7·8	39·8	3·1	1854–63
1855–64	31·9	9·6	8·7	7·7	40·6	3·0	1855–64
1856–65	33·8	10·6	9·4	7·2	41·4	3·3	1856–65
1857–66	34·6	10·5	10·8	7·5	40·3	3·1	1857–66
1858–67	33·7	10·2	10·5	7·1	40·0	3·0	1858–67
1859–68	34·4	11·1	10·3	7·2	40·4	3·1	1859–68

TABLE I(*a*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1860–69	34·7	11·7	9·4	6·9	41·6	3·5	1860–69
1861–70	33·5	11·2	9·0	7·1	39·8	3·2	1861–70
1862–71	34·1	11·4	8·7	7·1	37·9	3·6	1862–71
1863–72	34·4	12·3	9·2	6·5	38·0	4·3	1863–72
1864–73	34·5	12·9	9·0	6·4	39·9	4·5	1864–73
1865–74	34·4	12·6	10·5	6·4	38·6	4·0	1865–74
1866–75	34·3	12·5	10·7	6·9	38·9	4·4	1866–75
1867–76	34·0	12·4	10·0	7·4	38·4	4·6	1867–76
1868–77	35·6	12·8	11·1	8·1	40·4	5·0	1868–77
1869–78	35·2	12·1	11·1	8·1	40·4	4·5	1869–78
1870–79	33·9	11·8	10·0	7·9	40·1	4·0	1870–79
1871–80	34·1	11·6	10·3	8·3	41·2	3·7	1871–80
1872–81	33·1	9·2	10·0	7·6	40·7	3·2	1872–81
1873–82	33·3	8·5	10·3	8·1	39·6	2·4	1873–82
1874–83	32·7	7·7	9·8	8·1	37·9	2·4	1874–83
1875–84	32·3	8·1	9·8	8·1	38·0	2·3	1875–84
1876–85	32·7	8·8	8·9	8·2	38·1	2·4	1876–85
1877–86	32·5	8·3	8·7	7·6	38·4	2·2	1877–86
1878–87	32·7	8·1	8·7	7·9	36·5	2·0	1878–87
1879–88	31·9	7·8	8·5	7·8	35·7	2·3	1879–88
1880–89	31·9	7·5	9·7	7·7	34·9	2·0	1880–89
1881–90	33·9	8·2	10·8	7·5	34·9	2·4	1881–90
1882–91	33·8	10·2	11·9	8·0	35·8	2·7	1882–91
1883–92	32·8	9·4	11·4	7·7	35·1	2·5	1883–92
1884–93	31·0	8·7	10·8	7·4	34·2	1·7	1884–93
1885–94	31·0	8·7	10·2	7·3	34·7	2·4	1885–94
1886–95	29·0	7·2	9·8	7·1	33·4	2·0	1886–95
1887–96	28·5	7·4	10·0	7·0	32·1	1·4	1887–96
1888–97	26·6	7·1	8·7	6·5	31·5	1·1	1888–97
1889–98	28·3	7·6	9·4	6·5	31·7	1·1	1889–98
1890–99	28·6	8·5	9·5	7·0	31·9	1·2	1890–99
1891–1900	27·7	8·1	8·3	6·9	31·2	1·2	1891–1900
1892–1901	28·3	8·2	8·1	6·3	31·3	1·2	1892–1901
1893–1902	28·7	9·0	8·5	6·4	31·2	0·7	1893–1902
1894–1903	30·6	9·9	9·4	6·4	31·7	1·3	1894–1903
1895–1904	31·1	10·2	9·2	6·4	32·2	1·2	1895–1904
1896–1905	32·7	11·0	10·6	6·4	31·3	1·0	1896–1905
1897–1906	34·3	11·6	11·1	6·8	32·4	1·5	1897–1906
1898–1907	35·6	11·5	12·5	7·2	32·3	1·1	1898–1907
1899–1908	34·8	11·5	11·9	7·1	32·3	1·1	1899–1908

TABLE I(*a*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1900–09	35·0	10·5	12·1 ✓	6·7	31·3	1·1	1900–09
1901–10	35·0	10·6	12·8	6·9	30·7	0·7	1901–10
1902–11	35·2	10·9	12·8	7·8	30·5	0·3	1902–11
1903–12	35·4	10·0	11·4	7·8	32·1	1·3	1903–12
1904–13	36·1	9·9	10·4	8·6	32·5	1·7	1904–13
1905–14	35·3	9·4	10·1	8·2	31·8	1·0	1905–14
1906–15	35·4	9·8	9·5	8·2	33·0	1·0	1906–15
1907–16	35·7	10·0	10·0	8·5	34·0	0·7	1907–16
1908–17	35·2	10·6	8·2	8·2	35·6	0·9	1908–17
1909–18	34·5	9·8	8·2	8·0	35·8	0·8	1909–18
1910–19	34·1	10·3	7·2 ✓	8·1	37·6	1·5	1910–19
1911–20	34·8	10·7	7·4	7·9	38·2	1·7	1911–20
1912–21	35·7	11·2	8·6	7·5	39·1	1·6	1912–21
1913–22	35·8	10·5	8·9	7·5	39·3	1·6	1913–22
1914–23	35·3	10·6	10·5	7·0	38·6	0·6	1914–23
1915–24	35·7	10·8	10·3	7·8	38·8	1·4	1915–24
1916–25	36·3	11·1	11·0	8·0	39·4	1·9	1916–25
1917–26	35·8	11·6	9·5	8·3	39·7	2·6	1917–26
1918–27	36·7	11·7	11·6	8·6	38·6	3·0	1918–27
1919–28	39·1	13·0	12·2	8·7	39·1	3·8	1919–28
1920–29	38·5	12·2	11·9 ✓	8·6	38·6	3·0	1920–29
1921–30	38·8	11·9	11·8	8·8	39·5	3·7	1921–30
1922–31	37·6	10·8	10·7	8·7	39·1	3·7	1922–31
1923–32	37·6	10·6	12·1	9·0	37·5	3·7	1923–32
1924–33	38·4	10·4	11·1	8·7	38·5	4·3	1924–33
1925–34	39·2	10·5	12·1	8·2	38·8	4·0	1925–34
1926–35	38·9	11·7	11·4	7·6	37·4	3·1	1926–35
1927–36	37·5	11·0	11·7	7·3	36·7	2·9	1927–36
1928–37	38·1	11·1	10·8	7·6	38·5	3·7	1928–37
1929–38	37·3	10·5	11·0	7·4	38·5	3·1	1929–38
1930–39	37·1	11·2	11·4	7·2	38·0	3·5	1930–39
1931–40	34·5	10·1	9·7	6·1	37·4	2·8	1931–40
1932–41	33·7	10·6	7·9	5·7	37·0	3·1	1932–41
1933–42	33·7	10·7	6·3	5·3	(37·8)	2·9	1933–42
1934–43	33·2	11·0	6·2	5·4	(39·0)	2·9	1934–43
1935–44	32·8	10·6	6·6	5·3	(39·3)	2·3	1935–44
1936–45	31·1	11·0	6·3	5·2	(39·6)	2·5	1936–45
1937–46	32·6	11·2	6·4	5·6	(39·0)	2·6	1937–46
1938–47	31·8	10·9	6·1	5·2	(38·9)	2·2	1938–47
1939–48	31·9	11·2	5·1	4·9	(39·2)	2·6	1939–48

Bracketed values are 9-year means.

TABLE I(*a*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1940–49	33·6	10·4	6·4	5·1	(38·2)	2·1	1940–49
1941–50	35·6	11·1	7·2	6·5	(38·1)	2·1	1941–50
1942–51	37·2	11·3	9·0	7·2	(39·2)	2·3	1942–51
1943–52	37·4	11·1	10·4	7·4	38·2	1·9	1943–52
1944–53	36·3	10·1	10·7	7·5	35·5	1·3	1944–53
1945–54	34·9	10·0	9·2	7·5	33·9	1·3	1945–54
1946–55	36·2	9·8	9·2	7·0	35·1	1·8	1946–55
1947–56	34·4	8·7	9·3	6·0	34·7	1·4	1947–56
1948–57	35·4	8·9	10·3	5·9	33·4	0·8	1948–57
1949–58	33·6	7·4	10·5	5·6	32·4	0·5	1949–58
1950–59	31·9	7·9	9·6	5·6	33·4	0·3	1950–59
1951–60	30·0	7·3	9·1	4·6	33·2	0·0	1951–60
1952–61	30·2	7·7	8·7	4·4	33·2	0·1	1952–61
1953–62	30·8	8·3	9·0	4·6	34·1	0·5	1953–62
1954–63	30·3	7·8	7·2	4·5	33·8	0·2	1954–63

Bracketed values are 9-year means.

TABLE I(*b*)—NORTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JANUARY, VALUES FOR EACH JANUARY, MB

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1750	—	—	6	—	—	7	1750
1751	—	—	6	—	—	6	1751
1752	—	—	8	—	—	−2	1752
1753	—	—	4	—	—	7	1753
1754	—	—	18	—	—	2	1754
1755	—	—	4	—	—	−1	1755
1756	—	—	16	—	—	4	1756
1757	—	—	3	—	—	4	1757
1758	—	—	6	—	—	8	1758
1759	—	—	16	—	—	0	1759
1760	—	—	0	—	—	2	1760
1761	—	—	19	—	—	5	1761
1762	—	—	17	—	—	8	1762
1763	—	—	−1	—	—	3	1763
1764	—	—	12	—	—	5	1764
1765	—	—	6	—	—	4	1765
1766	—	—	8	—	—	−1	1766
1767	—	—	2	—	—	2	1767
1768	—	—	0	—	—	4	1768
1769	—	—	6	—	—	−2	1769
1770	—	—	12	—	—	0	1770
1771	—	—	7	—	—	0	1771
1772	—	—	1	—	—	0	1772
1773	—	—	15	—	—	1	1773
1774	—	—	7	—	—	−5	1774
1775	—	—	12	—	—	4	1775
1776	—	—	0	—	—	3	1776
1777	—	—	4	—	—	3	1777
1778	—	—	10	—	—	0	1778
1779	—	—	14	—	—	0	1779
1780	—	—	0	—	—	−3	1780
1781	—	—	5	—	—	−1	1781
1782	—	—	12	—	—	2	1782
1783	—	—	17	—	—	11	1783
1784	—	—	1	—	—	0	1784

TABLE I(*b*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1785			1			5	1785
1786			10			3	1786
1787			10			0	1787
1788			8			1	1788
1789			9			5	1789
1790			13			4	1790
1791			18			7	1791
1792			3			−2	1792
1793			11			3	1793
1794			14			3	1794
1795			−1			0	1795
1796			15			11	1796
1797			13			4	1797
1798			14			3	1798
1799			7			5	1799
1800			−3			4	1800
1801			15			2	1801
1802			9			6	1802
1803			−6			7	1803
1804			9			7	1804
1805			−1			5	1805
1806			17			6	1806
1807			11			4	1807
1808			15			4	1808
1809			−5			4	1809
1810			7			4	1810
1811			6			3	1811
1812			9			3	1812
1813			7			5	1813
1814			−1			3	1814
1815			3			5	1815
1816			10			4	1816
1817			16			5	1817
1818			21			5	1818
1819			14			6	1819
1820			1			3	1820
1821			5			4	1821
1822			12			−5	1822
1823			−6			2	1823
1824			17			2	1824

TABLE I(*b*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest—lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max.–Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1825	—	—	14	—	—	−2	1825
1826	—	—	5	—	—	2	1826
1827	—	—	8	—	—	0	1827
1828	—	—	4	—	—	5	1828
1829	—	—	−5	—	—	2	1829
1830	—	—	−3	—	—	−3	1830
1831	—	—	1	—	—	0	1831
1832	—	—	8	—	—	1	1832
1833	—	—	3	—	—	1	1833
1834	—	—	14	—	—	6	1834
1835	—	—	13	—	—	−1	1835
1836	—	—	13	—	—	−1	1836
1837	—	—	5	—	—	0	1837
1838	—	—	−6	—	—	4	1838
1839	—	—	17	—	—	−6	1839
1840	—	—	16	—	—	6	1840
1841	—	—	3	—	—	−2	1841
1842	—	—	3	—	—	5	1842
1843	—	—	15	—	—	2	1843
1844	—	—	11	—	—	−4	1844
1845	—	—	5	—	—	5	1845
1846	—	—	11	—	—	6	1846
1847	—	—	−3	—	—	7	1847
1848	—	—	0	—	—	6	1848
1849	—	—	12	—	—	2	1849
1850	—	—	2	—	—	2	1850
1851	—	—	18	—	—	9	1851
1852	—	—	22	—	—	7	1852
1853	—	—	10	5	—	5	1853
1854	—	—	10	9	—	7	1854
1855	—	—	3	9	—	−3	1855
1856	—	—	4	3	—	5	1856
1857	—	—	4	5	—	3	1857
1858	—	—	13	6	—	1	1858
1859	—	—	18	11	—	3	1859
1860	—	—	10	6	—	6	1860
1861	—	—	6	10	—	1	1861
1862	—	—	7	10	—	3	1862
1863	—	—	17	9	—	5	1863
1864	—	—	5	8	—	6	1864

TABLE I(*b*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest – lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max. – Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1865			10	4		0	1865
1866			18	6		3	1866
1867			1	1		2	1867
1868			11	7		2	1868
1869			9	8		7	1869
1870			6	8		3	1870
1871			3	10		5	1871
1872			12	4		10	1872
1873			15	8		7	1873
1874			20	8		1	1874
1875			12	9		4	1875
1876			11	11		5	1876
1877			12	8		6	1877
1878			11	7		−3	1878
1879			−2	6		2	1879
1880	27	7	9	12	43	0	1880
1881	25	−13	0	3	21	0	1881
1882	39	11	15	9	36	2	1882
1883	34	12	10	8	43	7	1883
1884	35	12	20	8	30	0	1884
1885	35	16	3	10	44	5	1885
1886	30	3	9	5	35	3	1886
1887	41	12	12	11	34	4	1887
1888	23	6	9	6	30	0	1888
1889	30	9	10	5	33	−1	1889
1890	47	14	20	10	43	4	1890
1891	24	7	11	8	30	3	1891
1892	29	3	10	6	29	0	1892
1893	16	5	4	5	34	−1	1893
1894	35	12	14	7	35	7	1894
1895	15	1	−1	8	31	1	1895
1896	25	5	11	4	22	−3	1896
1897	22	9	−1	6	28	1	1897
1898	40	11	16	6	32	0	1898
1899	33	18	11	10	35	0	1899
1900	38	10	8	9	36	4	1900
1901	30	8	9	2	31	3	1901
1902	33	11	14	7	28	−5	1902
1903	35	14	13	5	39	5	1903
1904	40	15	12	7	40	6	1904

TABLE I(*b*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest—lowest between 70°W and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max.—Atlantic min. at 55°N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1905	31	9	13	8	22	−1	1905
1906	41	11	16	8	33	2	1906
1907	35	8	13	10	27	−3	1907
1908	32	11	10	5	32	0	1908
1909	35	8	13	6	25	0	1909
1910	38	11	15	11	30	0	1910
1911	32	11	9	11	29	−1	1911
1912	35	20	0	7	44	5	1912
1913	42	13	3	13	43	9	1913
1914	32	10	9	3	33	−1	1914
1915	32	13	7	8	34	−1	1915
1916	44	13	21	11	43	−1	1916
1917	30	14	−5	7	43	−1	1917
1918	25	3	10	3	34	−1	1918
1919	31	13	3	7	43	7	1919
1920	45	15	17	9	36	2	1920
1921	41	16	21	7	38	−2	1921
1922	36	13	3	7	46	5	1922
1923	37	14	19	8	36	−1	1923
1924	36	12	7	11	35	7	1924
1925	38	16	14	10	40	4	1925
1926	39	18	6	9	46	6	1926
1927	39	15	16	10	32	3	1927
1928	49	16	16	9	39	7	1928
1929	25	5	0	6	38	−1	1929
1930	48	18	16	11	45	9	1930
1931	29	5	10	6	34	−2	1931
1932	36	11	17	10	30	5	1932
1933	45	12	9	5	46	5	1933
1934	44	13	17	6	38	4	1934
1935	35	4	7	4	26	−5	1935
1936	25	11	9	6	39	4	1936
1937	45	16	7	13	50	11	1937
1938	41	10	18	7	39	1	1938
1939	23	12	4	4	33	3	1939
1940	22	7	−1	0	39	2	1940
1941	21	10	−8	2	30	1	1941
1942	36	12	1	6	—	3	1942
1943	40	15	8	6	57	5	1943
1944	40	9	21	5	41	−2	1944

TABLE I(*b*)—*continued*

	North Atlantic Westerlies: Over-all pressure difference highest—lowest between 70°N and 20°E	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	North Atlantic Westerlies: Pressure difference over British Isles 50–60°N at 0°E	North Atlantic Trades: Pressure difference 30–10°N at 60°W	Meridional Index: Over-all pressure difference Asian max.—Atlantic min. at 55° N	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1945	18	8	4	3	28	−3	1945
1946	40	13	10	10	34	5	1946
1947	37	13	4	9	49	7	1947
1948	42	13	8	4	42	5	1948
1949	40	4	17	6	24	−2	1949
1950	42	14	7	14	38	2	1950
1951	37	12	10	9	40	3	1951
1952	38	10	15	8	29	−1	1952
1953	29	5	11	7	30	−1	1953
1954	26	8	6	5	25	−2	1954
1955	31	6	4	−2	40	2	1955
1956	22	2	11	0	30	1	1956
1957	47	15	14	8	36	1	1957
1958	24	−2	10	1	32	2	1958
1959	23	9	8	6	34	−4	1959
1960	23	8	2	4	36	−1	1960
1961	39	16	6	7	40	4	1961
1962	44	16	18	10	38	3	1962
1963	24	0	−7	6	27	−4	1963

TABLE II(*a*)—SOUTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JANUARY, 10-YEAR MEAN VALUES, MB

	South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies: (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1860–69	—	*6·5*	1·9	1895–1904	3·5	6·3	3·7
1861–70	—	*6·5*	1·7	1896–1905	3·6	6·3	3·7
1862–71	—	*6·6*	1·3	1897–1906	3·6	6·1	3·7
1863–72	—	*6·5*	1·3	1898–1907	3·7	6·1	3·6
1864–73	—	*6·3*	1·7	1899–1908	3·7	5·8	3·4
1865–74	—	*6·3*	1·9	1900–09	3·7	5·8	3·8
1866–75	—	*6·4*	2·4	1901–10	3·6	6·0	3·6
1867–76	—	*6·6*	2·2	1902–11	3·8	6·3	3·4
1868–77	—	*6·8*	2·8	1903–12	3·7	6·3	3·6
1869–78	—	*6·7*	2·9	1904–13	3·6	6·3	3·6
1870–79	—	*6·8*	3·0	1905–14	3·6	6·3	3·8
1871–80	—	*6·8*	3·2	1906–15	3·5	6·4	4·0
1872–81	—	*6·6*	3·6	1907–16	3·5	6·6	4·0
1873–82	—	*6·8*	3·2	1908–17	3·6	6·8	4·2
1874–83	—	*7·0*	2·7	1909–18	3·6	7·2	4·2
1875–84	—	*7·0*	2·0	1910–19	3·6	6·9	4·3
1876–85	—	*6·9*	0·9	1911–20	3·7	6·3	4·3
1877–86	—	*6·6*	0·8	1912–21	3·5	6·1	4·3
1878–87	—	*6·5*	0·7	1913–22	3·6	6·0	3·9
1879–88	—	*6·3*	0·7	1914–23	3·7	6·0	3·4
1880–89	—	*5·9*	0·8	1915–24	3·6	5·8	3·3
1881–90	—	*5·9*	0·7	1916–25	3·7	5·9	3·0
1882–91	—	*5·9*	0·1	1917–26	3·5	5·8	2·9
1883–92	—	*5·7*	0·7	1918–27	3·3	5·8	2·8
1884–93	—	*5·4*	0·9	1919–28	3·3	5·9	2·6
1885–94	—	*5·5*	1·3	1920–29	3·2	6·0	2·3
1886–95	—	*5·4*	2·0	1921–30	3·1	6·2	2·5
1887–96	—	*5·7*	2·6	1922–31	3·1	6·1	3·1
1888–97	—	*5·6*	2·5	1923–32	3·0	6·3	3·4
1889–98	—	5·7	2·6	1924–33	3·0	6·3	3·7
1890–99	—	6·0	2·4	1925–34	3·0	6·7	3·7
1891–1900	—	6·3	2·6	1926–35	2·9	6·6	3·9
1892–1901	3·4	6·2	3·3	1927–36	3·2	6·6	3·6
1893–1902	3·4	6·3	3·3	1928–37	3·3	6·4	3·6
1894–1903	3·5	6·4	3·6	1929–38	3·3	6·3	3·8

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE II(*a*)—*continued*

	South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1930–39	3·2	6·5	4·0	1945–54	3·3	5·9	2·9
1931–40	3·2	6·4	4·1	1946–55	3·5	6·1	3·0
1932–41	3·2	6·6	3·5	1947–56	3·5	6·0	3·0
1933–42	3·3	6·4	3·3	1948–57	3·8	6·0	3·2
1934–43	3·2	6·5	3·3	1949–58	3·9	6·1	3·2
1935–44	3·1	6·1	3·1	1950–59	4·1	6·2	2·9
1936–45	3·0	5·9	3·0	1951–60	4·1	6·4	3·1
1937–46	2·8	5·9	3·3	1952–61	3·7	6·7	2·9
1938–47	2·7	6·0	3·1	1953–62	3·6	6·7	2·5
1939–48	2·6	5·7	3·1	1954–63	3·4	7·2	2·8
1940–49	2·6	5·6	3·0				
1941–50	2·6	5·5	2·9				
1942–51	2·8	5·5	2·9				
1943–52	2·8	5·6	3·2				
1944–53	3·0	5·5	2·9				

TABLE II(*b*)—SOUTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JANUARY, VALUES FOR EACH JANUARY, MB

	South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies: (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1860	—	—	3	1895	3	5	3
1861	—	—	3	1896	4	7	4
1862	—	—	2	1897	2	5	4
1863	—	—	1	1898	3	6	5
1864	—	—	3	1899	4	7	1
1865	—	—	2	1900	4	10	4
1866	—	—	1	1901	3	5	4
1867	—	—	0	1902	4	7	4
1868	—	—	3	1903	4	5	5
1869	—	—	1	1904	4	6	3
1870	—	—	1	1905	4	5	3
1871	—	—	−1	1906	4	5	4
1872	—	—	2	1907	3	5	3
1873	—	—	5	1908	3	3	3
1874	—	—	5	1909	4	7	5
1875	—	—	7	1910	3	12	2
1876	—	—	−1	1911	5	8	2
1877	—	—	6	1912	3	7	6
1878	—	—	4	1913	3	5	5
1879	—	—	2	1914	4	6	5
1880	—	—	3	1915	3	6	5
1881	—	—	3	1916	4	7	4
1882	—	—	−2	1917	4	7	5
1883	—	—	0	1918	3	7	3
1884	—	—	−2	1919	4	4	6
1885	—	—	−4	1920	4	6	2
1886	—	—	−2	1921	3	6	2
1887	—	—	5	1922	4	6	2
1888	—	—	4	1923	4	5	0
1889	—	4	3	1924	3	4	4
1890	—	7	2	1925	4	7	2
1891	—	6	−3	1926	2	6	3
1892	4	6	4	1927	2	7	4
1893	3	4	2	1928	3	8	1
1894	4	7	2	1929	3	5	3

TABLE II(*b*)—*continued*

	South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 20–10°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1930	3	8	4	1950	3	6	4
1931	3	5	8	1951	5	7	2
1932	3	8	5	1952	4	7	6
1933	4	5	3	1953	5	5	0
1934	3	8	4	1954	5	8	2
1935	3	6	4	1955	4	6	4
1936	5	6	0	1956	3	5	3
1937	3	5	4	1957	5	6	4
1938	3	7	3	1958	3	5	3
1939	2	7	5	1959	4	7	1
1940	3	7	5	1960	3	8	6
1941	3	7	2	1961	1	10	0
1942	4	6	3	1962	3	7	2
1943	3	6	3	1963	3	10	3
1944	2	4	2				
1945	2	4	3				
1946	3	6	3				
1947	2	6	2				
1948	2	4	3				
1949	2	6	4				

TABLE III(*a*)—POSITION INDICES IN JANUARY, 10-YEAR MEAN VALUES

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1786–95	*62·6*	*28·7*	—	—	—	—	—	—	—	*62·5*	*21·4*	1786–95
1787–96	*62·4*	*29·1*	—	—	—	—	—	—	—	*63·0*	*22·9*	1787–96
1788–97	*62·4*	*30·0*	—	—	—	—	—	—	—	*62·5*	*25·2*	1788–97
1789–98	*63·0*	*31·6*	—	—	—	—	—	—	—	*62·5*	*27·7*	1789–98
1790–99	*63·4*	*31·8*	—	—	—	—	—	—	—	*61·9*	*28·2*	1790–99
1791–1800	*62·5*	*31·1*	—	—	—	—	—	—	—	*61·2*	*28·5*	1791–1800
1792–1801	*62·8*	*31·6*	—	—	—	—	—	—	—	*61·7*	*26·6*	1792–1801
1793–1802	*63·0*	*32·6*	—	—	—	—	—	—	—	*62·2*	*26·8*	1793–1802
1794–1803	*62·4*	*31·8*	—	—	—	—	—	—	—	*61·4*	*27·8*	1794–1803
1795–1804	*62·4*	*31·1*	—	—	—	—	—	—	—	*60·2*	*27·0*	1795–1804
1796–1805	*61·9*	*30·6*	—	—	—	—	—	—	—	*59·4*	*26·8*	1796–1805
1797–1806	*62·1*	*30·6*	—	—	—	—	—	—	—	*58·1*	*25·6*	1797–1806
1798–1807	*61·6*	*30·5*	—	—	—	—	—	—	—	*57·8*	*25·3*	1798–1807
1799–1808	*61·4*	*29·7*	—	—	—	—	—	—	—	*56·8*	*25·1*	1799–1808
1800–09	*60·4*	*29·5*	—	—	—	—	—	—	—	*57·4*	*25·6*	1800–09
1801–10	*60·9*	*30·2*	—	—	—	—	—	—	—	*55·6*	*24·0*	1801–10
1802–11	*60·6*	*30·4*	—	—	—	—	—	—	—	*54·6*	*23·4*	1802–11
1803–12	*60·4*	*29·7*	—	—	—	—	—	—	—	*53·8*	*22·5*	1803–12
1804–13	*60·7*	*30·2*	—	—	—	—	—	—	—	*53·3*	*20·7*	1804–13
1805–14	*59·6*	*30·2*	—	—	—	—	—	—	—	*53·0*	*20·8*	1805–14
1806–15	*59·8*	*30·5*	—	—	—	—	—	—	—	*53·2*	*21·0*	1806–15
1807–16	*59·7*	*30·8*	—	—	—	—	—	—	—	*53·2*	*20·7*	1807–16
1808–17	*59·8*	*30·8*	—	—	—	—	—	—	—	*53·0*	*17·2*	1808–17
1809–18	*59·9*	*30·7*	—	—	—	—	—	—	—	*53·0*	*15·7*	1809–18
1810–19	*60·7*	*30·9*	—	—	—	—	—	—	—	*51·5*	*11·6*	1810–19
1811–20	*60·1*	*30·0*	—	—	—	—	—	—	—	*51·5*	*9·9*	1811–20
1812–21	*60·3*	*29·6*	—	—	—	—	—	—	—	*51·2*	*9·9*	1812–21
1813–22	*60·5*	*30·1*	—	—	—	—	—	—	—	*51·3*	*9·1*	1813–22
1814–23	*59·0*	*29·8*	—	—	—	—	—	—	—	*50·1*	*9·2*	1814–23

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE III(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1815–24	*60·3*	*30·3*	—	—	—	—	—	—	—	*50·9*	*7·4*	1815–24
1816–25	*60·6*	*31·2*	—	—	—	—	—	—	—	*51·2*	*6·2*	1816–25
1817–26	*60·5*	*30·8*	—	—	—	—	—	—	—	*51·0*	*3·5*	1817–26
1818–27	*60·6*	*31·0*	—	—	—	—	—	—	—	*52·3*	*7·0*	1818–27
1819–28	*60·5*	*31·2*	—	—	—	—	—	—	—	*52·1*	*8·9*	1819–28
1820–29	60·3	31·1	—	—	—	—	—	—	—	52·6	12·0	1820–29
1821–30	61·2	31·5	—	—	—	—	—	—	—	52·6	13·3	1821–30
1822–31	60·6	31·0	—	—	—	—	—	—	—	52·5	12·8	1822–31
1823–32	60·3	31·1	—	—	—	—	—	—	—	51·3	9·3	1823–32
1824–33	62·3	32·2	—	—	—	—	—	—	—	56·3	5·8	1824–33
1825–34	61·8	31·8	—	—	—	—	—	—	—	53·5	4·1	1825–34
1826–35	61·8	31·3	—	—	—	—	—	—	—	53·3	5·1	1826–35
1827–36	62·2	32·2	—	—	—	—	—	—	—	54·3	4·8	1827–36
1828–37	61·6	31·4	—	—	—	—	—	—	—	53·0	0·1	1828–37
1829–38	62·0	32·9	—	—	—	—	—	—	—	57·7	3·4	1829–38
1830–39	62·6	33·7	—	—	—	—	—	—	—	60·9	4·1	1830–39
1831–40	62·2	33·8	—	—	—	—	—	—	—	61·7	5·3	1831–40
1832–41	62·4	34·8	—	—	—	—	—	—	—	63·6	9·3	1832–41
1833–42	62·5	34·3	—	—	—	—	—	—	—	64·0	12·8	1833–42
1834–43	61·9	33·5	—	—	—	—	—	—	—	59·0	15·3	1834–43
1835–44	61·9	33·6	—	—	—	—	—	—	—	61·1	17·3	1835–44
1836–45	61·9	33·4	—	—	—	49·3	—	—	—	60·8	17·6	1836–45
1837–46	61·5	32·4	—	—	—	49·2	—	—	—	59·8	18·1	1837–46
1838–47	62·2	32·5	—	—	—	49·2	—	—	—	59·5	21·8	1838–47
1839–48	61·8	31·5	—	—	—	49·0	—	—	—	54·2	17·6	1839–48
1840–49	61·4	29·9	(1·9)	—	—	48·6	—	—	—	50·9	14·4	1840–49
1841–50	61·1	29·3	(2·1)	—	—	48·7	—	—	—	49·6	12·9	1841–50
1842–51	61·3	28·7	2·0	—	—	47·5	—	—	—	46·4	7·6	1842–51
1843–52	61·3	28·3	2·2	—	—	48·2	—	—	—	46·4	7·0	1843–52
1844–53	61·5	28·2	1·9	—	—	48·0	—	—	—	47·6	8·3	1844–53

Values in italics are only reliable if combined in 40-year, or longer, means. Bracketed values are 9-year means.

TABLE III(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1845–54	62·0	28·6	1·5	—	—	48·5	—	—	—	46·6	9·0	1845–54
1846–55	61·7	28·2	1·7	—	—	49·0	—	—	—	45·1	7·5	1846–55
1847–56	61·3	28·2	1·4	—	—	48·8	—	—	—	45·1	10·5	1847–56
1848–57	60·9	28·6	1·4	—	—	49·2	—	—	—	45·4	11·3	1848–57
1849–58	61·3	28·8	1·6	—	—	48·8	—	—	—	45–5	10·0	1849–58
1850–59	61·5	29·7	1·9	—	—	49·0	2·8	*9·5*	*36·3*	46·8	9·8	1850–59
1851–60	61·5	30·0	1·8	—	—	49·1	3·2	*9·8*	*37·1*	45·1	6·8	1851–60
1852–61	62·1	30·1	1·5	—	—	50·0	3·4	*9·7*	*37·6*	46·3	6·1	1852–61
1853–62	62·5	30·4	1·1	—	—	50·0	3·7	*9·6*	*37·9*	46·5	7·7	1853–62
1854–63	62·3	30·2	1·5	—	—	49·6	3·7	*10·0*	*38·0*	46·0	6·4	1854–63
1855–64	62·3	29·6	2·1	—	—	48·9	3·8	*9·1*	*37·6*	45·7	3·9	1855–64
1856–65	62·3	29·5	1·9	—	—	48·7	3·6	*9·7*	*38·2*	46·7	3·6	1856–65
1857–66	62·9	29·5	2·2	—	—	48·7	4·0	*8·8*	*38·2*	45·5	0·1	1857–66
1858–67	62·2	28·7	2·5	—	—	48·4	4·3	*9·4*	*38·3*	44·2	2·0°E	1858–67
1859–68	61·8	28·7	2·5	—	—	48·2	4·7	*9·5*	*38·3*	45·7	1·0°E	1859–68
1860–69	61·9	28·1	2·4	*32·7*	39·1	48·5	4·9	*10·2*	*38·0*	44·7	0·8°E	1860–69
1861–70	62·6	28·4	2·3	*32·3*	38·6	48·4	4·1	*9·9*	*37·5*	46·4	3·7	1861–70
1862–71	62·3	28·5	3·0	*32·3*	38·4	47·3	4·1	*10·1*	*37·5*	46·9	6·9	1862–71
1863–72	61·5	28·5	2·8	*32·8*	38·1	47·5	3·9	*9·8*	*37·7*	47·2	5·9	1863–72
1864–73	61·2	28·8	2·7	*34·2*	38·1	47·9	4·0	*9·4*	*37·9*	47·5	4·1	1864–73
1865–74	61·1	29·6	2·3	*34·3*	37·3	48·4	4·6	*11·1*	*38·3*	48·0	3·4	1865–74
1866–75	60·9	29·9	2·8	*34·0*	36·7	48·6	4·5	*10·9*	*38·2*	49·0	1·6	1866–75
1867–76	61·2	30·9	2·9	*33·8*	35·7	48·8	4·6	*12·2*	*38·7*	51·4	0·1°E	1867–76
1868–77	62·0	31·3	3·0	*33·7*	35·0	49·0	4·9	*12·2*	*38·5*	51·2	0·8°E	1868–77
1869–78	62·6	31·8	2·4	*33·9*	35·2	49·7	4·9	*12·6*	*38·9*	51·6	0·3°E	1869–78
1870–79	61·7	32·1	2·0	*33·8*	35·3	49·8	5·3	12·1	*38·9*	52·8	2·2	1870–79
1871–80	61·7	31·6	2·0	*34·0*	34·9	50·3	5·6	12·5	*39·3*	51·8	0·1°E	1871–80
1872–81	59·6	30·2	1·6	*33·6*	34·2	50·2	5·9	12·7	*39·4*	49·3	(3·1°E)	1872–81
1873–82	60·2	30·2	1·8	*33·8*	33·8	49·2	6·4	13·2	*39·9*	48·3	(4·0°E)	1873–82
1874–83	60·8	30·1	1·6	*33·0*	33·1	48·9	6·7	13·6	*40·2*	46·3	(2·8°E)	1874–83

Values in italics are only reliable if combined in 40-year, or longer means. Bracketed values are 9-year means.

TABLE III(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1875–84	60·8	29·8	1·3	*32·6*	33·2	48·6	6·7	13·3	*40·2*	45·8	(1·4°E)	1875–84
1876–85	61·2	30·0	0·8	*32·6*	33·2	48·3	7·7	13·9	*40·4*	42·3	(0·2°E)	1876–85
1877–86	60·9	30·3	0·6	*32·1*	33·3	48·6	8·0	13·5	*40·1*	42·3	(6·3)	1877–86
1878–87	61·2	31·3	0·1°N	*31·5*	33·3	49·0	8·3	13·5	*40·7*	44·5	(1·0)	1878–87
1879–88	60·5	30·3	0·1°N	*31·5*	33·3	48·5	8·4	13·9	*40·4*	42·8	(8·8)	1879–88
1880–89	61·5	30·6	0·3	*31·3*	32·8	48·2	8·9	14·2	*40·3*	42·6	(8·6)	1880–89
1881–90	61·3	30·8	0·4	*31·3*	32·8	47·7	9·3	14·2	*40·4*	42·4	(8·1)	1881–90
1882–91	63·3	32·5	0·4	*31·1*	32·7	48·4	9·4	14·7	*40·1*	45·4	8·3	1882–91
1883–92	63·1	32·8	0·8	*31·0*	33·2	49·0	9·9	15·0	*39·5*	46·4	10·8	1883–92
1884–93	62·7	33·2	0·9	*31·0*	33·7	49·8	9·9	15·4	*39·1*	48·8	11·5	1884–93
1885–94	62·5	33·0	1·2	*31·2*	33·8	50·1	9·7	15·9	*39·3*	49·5	11·5	1885–94
1886–95	62·2	33·4	1·2	*31·2*	33·1	50·4	9·7	16·1	*39·2*	53·0	14·7	1886–95
1887–96	62·5	32·5	1·2	*31·7*	33·1	50·2	9·5	16·7	*39·3*	51·0	12·5	1887–96
1888–97	62·7	32·0	1·6	*32·4*	33·1	49·8	9·3	16·6	*38·8*	49·8	12·7	1888–97
1889–98	63·2	32·2	1·8	*32·4*	33·1	49·4	9·3	16·5	*38·9*	50·0	10·3	1889–98
1890–99	62·6	31·7	2·9	*32·6*	34·0	49·1	9·3	16·2	*38·9*	47·2	8·5	1890–99
1891–1900	62·8	32·0	3·1	*32·8*	34·5	49·3	9·3	16·1	*38·7*	49·2	9·9	1891–1900
1892–1901	63·0	31·1	2·7	*33·3*	35·0	48·7	9·4	16·0	*38·9*	47·9	8·9	1892–1901
1893–1902	62·9	31·0	2·1	*33·6*	35·4	48·3	9·3	16·1	*39·2*	47·6	6·6	1893–1902
1894–1903	63·1	30·4	2·1	*33·9*	35·2	48·0	9·2	15·9	*39·2*	47·9	8·4	1894–1903
1895–1904	63·3	30·5	2·0	*34·5*	35·7	48·1	9·5	15·7	*39·1*	48·2	8·4	1895–1904
1896–1905	63·7	30·1	2·3	*34·4*	36·6	47·4	9·1	14·8	*38·9*	47·7	5·9	1896–1905
1897–1906	63·7	30·0	2·6	*34·6*	36·9	47·5	9·3	14·3	*39·2*	47·5	4·9	1897–1906
1898–1907	63·6	30·6	2·2	*34·1*	37·1	47·3	9·2	14·5	*39·6*	48·0	3·7	1898–1907
1899–1908	63·6	31·1	2·3	*34·0*	37·3	47·3	9·7	14·0	*39·7*	48·8	7·4	1899–1908
1900–09	64·2	31·4	1·7	*34·0*	37·4	47·3	9·6	13·5	40·2	50·6	8·9	1900–09
1901–10	64·0	31·2	1·8	*34·0*	37·4	47·1	9·6	13·9	41·0	50·6	8·4	1901–10
1902–11	64·0	32·1	1·5	*33·8*	37·8	47·5	9·4	13·9	41·3	50·6	10·2	1902–11
1903–12	63·3	31·6	1·5	*33·8*	37·8	47·5	9·3	13·5	41·2	50·1	8·9	1903–12
1904–13	62·9	31·9	1·4	*33·4*	38·0	46·7	9·7	13·7	41·2	46·9	3·9	1904–13

Values in italics are only reliable if combined in 40-year, or longer, means. Bracketed values are 9-year means.

TABLE III(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1905–14	63·0	31·3	1·7	*32·9*	37·8	45·8	9·9	13·9	41·0	46·9	4·4	1905–14
1906–15	62·6	31·6	1·6	*33·0*	37·8	47·5	10·0	15·1	41·1	46·4	6·6	1906–15
1907–16	62·4	31·7	1·3	*32·7*	38·0	47·2	10·5	15·6	40·8	47·1	7·4	1907–16
1908–17	60·9	31·0	1·8	*32·9*	37·6	47·7	11·1	16·1	40·5	46·6	7·4	1908–17
1909–18	59·6	30·0	1·8	*32·9*	37·3	47·9	10·9	16·5	40·7	44·9	4·7	1909–18
1910–19	59·1	30·0	1·7	32·7	36·7	48·7	11·0	17·5	40·3	46·4	5·7	1910–19
1911–20	59·0	29·9	1·7	32·6	36·7	48·6	12·0	17·7	39·4	46·1	6·0	1911–20
1912–21	58·5	29·5	1·7	32·4	36·4	48·3	11·9	17·3	38·8	46·4	4·7	1912–21
1913–22	59·1	29·8	1·9	32·0	35·6	49·6	12·2	18·0	38·5	46·9	8·3	1913–22
1914–23	59·5	29·9	2·0	32·0	35·3	50·3	11·6	18·2	38·3	49·9	12·5	1914–23
1915–24	59·5	30·3	1·7	31·7	35·5	51·2	12·0	18·3	38·2	49·7	14·2	1915–24
1916–25	60·2	29·8	1·5	31·4	35·3	49·9	11·7	18·3	38·9	49·4	11·0	1916–25
1917–26	59·8	29·5	1·7	31·5	35·1	50·2	11·6	18·2	38·9	48·7	10·4	1917–26
1918–27	61·0	29·9	1·5	31·6	35·4	50·1	10·7	17·9	39·5	49·5	10·9	1918–27
1919–28	62·1	30·7	1·3	31·6	35·7	50·2	10·1	18·1	39·1	50·0	12·1	1919–28
1920–29	61·4	29·7	1·6	31·9	35·7	49·4	10·4	18·0	39·0	47·5	10·1	1920–29
1921–30	61·4	30·1	1·9	31·6	35·7	49·4	9·9	17·9	38·0	43·8	8·1	1921–30
1922–31	61·6	29·9	2·0	31·6	35·6	49·7	10·2	18·1	39·0	44·6	9·8	1922–31
1923–32	62·0	30·1	1·5	31·3	35·7	48·2	10·5	18·3	39·4	43·4	6·9	1923–32
1924–33	62·4	29·9	1·5	31·3	35·5	48·8	10·6	18·2	39·6	42·4	5·2	1924–33
1925–34	62·4	30·2	1·7	31·5	35·2	48·8	10·6	18·1	40·1	42·1	3·0	1925–34
1926–35	62·4	31·5	1·5	31·7	35·4	48·8	11·4	18·0	39·2	43·1	5·1	1926–35
1927–36	61·7	31·2	1·1	31·6	35·3	48·5	11·0	17·8	39·7	42·3	6·1	1927–36
1928–37	61·7	31·1	1·0	31·5	35·6	48·6	11·5	17·6	39·2	39·5	(4·5)	1928–37
1929–38	61·7	31·0	0·8	31·5	35·4	48·9	11·6	17·0	39·1	39·4	(5·1)	1929–38
1930–39	61·7	31·5	0·5	31·4	35·9	48·9	11·0	16·7	39·6	39·6	(3·8)	1930–39
1931–40	60·6	30·3	0·0	31·8	35·9	50·6	10·8	16·8	40·0	42·6	(4·5)	1931–40
1932–41	59·5	29·9	0·2°N	31·9	36·4	50·1	10·8	16·6	40·5	41·5	(1·6)	1932–41
1933–42	59·4	30·0	0·2	32·3	36·7	50·7	9·9	16·0	40·1	43·5	(3·8)	1933–42
1934–43	58·5	29·9	0·1	32·5	36·9	50·7	10·0	15·7	40·1	42·8	(3·3)	1934–43

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TABLE III(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1935–44	58·5	29·5	0·1°N	31·9	37·2	50·6	9·3	15·4	39·7	42·8	(3·3)	1935–44
1936–45	57·3	28·3	0·1°N	31·8	37·4	50·9	8·6	15·2	39·7	43·4	(2·7)	1936–45
1937–46	58·4	28·8	0·1	31·8	37·4	50·7	8·3	15·3	38·9	45·2	(1·7)	1937–46
1938–47	58·3	28·5	0·1	31·6	36·5	50·8	8·1	15·2	39·1	46·9	1·3	1938–47
1939–48	57·7	28·5	0·3	31·6	36·7	50·1	8·3	15·4	39·4	47·7	3·0	1939–48
1940–49	59·1	29·4	0·4	31·6	36·5	50·2	8·1	15·4	39·1	48·5	5·2	1940–49
1941–50	60·3	30·4	0·8	31·7	36·2	48·4	7·7	15·3	38·7	47·8	5·7	1941–50
1942–51	61·3	31·1	1·1	31·7	35·4	49·1	7·9	15·5	39·2	48·8	6·2	1942–51
1943–52	61·2	31·2	1·3	31·8	35·5	48·8	8·3	15·6	39·4	48·6	6·9	1943–52
1944–53	61·9	31·8	1·4	31·6	35·0	47·7	8·0	15·2	39·4	52·8	8·5	1944–53
1945–54	61·9	32·5	1·6	31·6	34·9	47·8	7·8	15·2	39·6	53·6	9·7	1945–54
1946–55	61·7	32·0	1·6	31·7	35·0	47·4	7·5	15·2	39·3	52·4	9·7	1946–55
1947–56	61·7	31·5	1·7	31·0	35·5	48·2	7·2	15·2	39·4	53·2	12·6	1947–56
1948–57	62·1	31·7	2·2	31·0	36·5	47·6	7·1	15·1	38·9	53·8	12·8	1948–57
1949–58	62·8	31·3	2·0	30·8	36·0	48·1	7·0	15·3	38·4	54·3	11·6	1949–58
1950–59	61·4	30·4	1·9	30·7	36·0	48·1	7·1	15·6	38·5	54·5	9·4	1950–59
1951–60	60·5	29·6	1·6	30·1	36·5	48·3	7·7	15·9	38·5	54·7	9·2	1951–60
1952–61	60·4	29·3	1·5	30·0	35·8	48·0	7·1	15·3	37·6	54·6	(10·2)	1952–61
1953–62	60·4	29·1	1·3	29·8	34·6	48·2	6·6	15·6	37·6	54·3	(8·6)	1953–62
1954–63	58·1	28·1	0·9	29·8	34·4	48·8	6·4	16·0	37·5	48·6	(4·4)	1954–63

Bracketed values are 9-year means.

TABLE III(*b*)—POSITION INDICES IN JANUARY, POSITIONS EACH JANUARY

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1836	—	—	—	—	—	49	—	—	—	—	—	1836
1837	—	—	—	—	—	45	—	—	—	—	—	1837
1838	—	—	—	—	—	55	—	—	—	—	—	1838
1839	—	—	—	—	—	51	—	—	—	—	—	1839
1840	—	—	—	—	—	48	—	—	—	—	—	1840
1841	—	—	—	—	—	59	—	—	—	—	—	1841
1842	—	—	—	—	—	45	—	—	—	—	—	1842
1843	—	—	—	—	—	51	—	—	—	—	—	1843
1844	—	—	—	—	—	45	—	—	—	—	—	1844
1845	—	—	—	—	—	45	—	—	—	—	—	1845
1846	—	—	—	—	—	48	—	—	—	—	—	1846
1847	—	—	—	—	—	45	—	—	—	—	—	1847
1848	—	—	—	—	—	53	—	—	—	—	—	1848
1849	—	—	—	—	—	47	—	—	—	—	—	1849
1850	—	—	—	—	—	49	3·8	—	—	—	—	1850
1851	—	—	—	—	—	47	3·6	—	—	—	—	1851
1852	—	—	—	—	—	52	1·2	—	—	—	—	1852
1853	—	—	—	—	—	49	4·2	—	—	—	—	1853
1854	—	—	—	—	—	50	0·2	—	—	—	—	1854
1855	—	—	—	—	—	50	4·8	—	—	—	—	1855
1856	—	—	—	—	—	46	2·2	—	—	—	—	1856
1857	—	—	—	—	—	49	3·8	—	—	—	—	1857
1858	—	—	—	—	—	49	3·6	—	—	—	—	1858
1859	—	—	—	—	—	49	0·4	—	—	—	—	1859
1860	—	—	—	—	42	50	8·4	—	—	—	—	1860
1861	—	—	—	—	40	56	5·2	—	—	—	—	1861
1862	—	—	—	—	38	52	4·2	—	—	—	—	1862
1863	—	—	—	—	40	45	4·0	—	—	—	—	1863
1864	—	—	—	—	39	43	1·0	—	—	—	—	1864

TABLE III(*b*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1865	—	—	—	—	41	48	3·0	—	—	—	—	1865
1866	—	—	—	—	42	46	6·8	—	—	—	—	1866
1867	—	—	—	—	42	46	6·0	—	—	—	—	1867
1868	—	—	—	—	33	47	8·4	—	—	—	—	1868
1869	—	—	—	—	34	52	1·8	—	—	—	—	1869
1870	—	—	—	—	37	49	0·4	10·5	—	—	—	1870
1871	—	—	—	—	38	45	5·6	10·7	—	—	—	1871
1872	—	—	—	—	35	54	1·8	7·5	—	—	—	1872
1873	—	—	—	—	40	49	5·6	10·3	—	—	—	1873
1874	—	—	—	—	31	48	6·4	15·5	—	—	—	1874
1875	—	—	—	—	35	50	2·2	7·5	—	—	—	1875
1876	—	—	—	—	32	48	7·4	15·5	—	—	—	1876
1877	—	—	—	—	35	48	9·2	14·5	—	—	—	1877
1878	—	—	—	—	35	54	8·8	15·5	—	—	—	1878
1879	—	—	—	—	35	53	5·2	13·3	—	—	—	1879
1880	65	29	—	—	33	54	4·2	14·3	—	37	2°W	1880
1881	43	18	—	—	31	44	8·2	12·7	—	30	—	1881
1882	65	30	—	—	31	44	6·4	12·5	—	45	2	1882
1883	65	30	—	—	33	46	8·6	14·7	—	30	2°E	1883
1884	63	32	—	—	32	45	6·8	12·5	—	40	0	1884
1885	63	30	—	—	35	47	12·2	13·3	—	20	2°E	1885
1886	62	42	—	—	33	51	10·2	11·7	—	62	32	1886
1887	64	35	—	—	35	52	12·2	15·0	—	57	25	1887
1888	60	26	—	—	35	49	10·2	19·0	—	45	2	1888
1889	65	34	—	—	30	50	10·0	16·5	—	60	18	1889
1890	63	31	0·7°N	—	33	49	7·8	14·0	—	35	2°E	1890
1891	63	35	0·3	—	30	51	9·6	17·7	—	60	10	1891
1892	63	33	6·3	—	36	50	11·0	16·0	—	55	27	1892
1893	61	34	1·3	—	38	54	9·2	18·0	—	54	5	1893
1894	61	30	1·3	—	33	48	4·6	17·3	—	47	0	1894

TABLE III(*b*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1895	60	34	0·3	—	28	50	12·4	15·7	—	55	30	1895
1896	65	33	2·0	—	33	49	8·2	18·0	—	42	10	1896
1897	66	30	2·3	—	35	48	10·2	14·0	—	45	27	1897
1898	65	28	1·3	—	35	45	10·0	17·5	—	47	22°E	1898
1899	59	29	7·5	—	39	47	10·2	13·5	—	32	0	1899
1900	65	34	0·5	—	38	51	7·8	13·5	39·3	55	12	1900
1901	65	26	4·0	—	35	45	10·8	16·7	39·7	47	0	1901
1902	62	32	0·3	—	40	46	10·0	16·7	41·7	52	4	1902
1903	63	28	2·0	—	36	51	8·2	15·7	38·3	57	23	1903
1904	63	31	0·0	—	38	49	7·4	16·0	38·7	50	0	1904
1905	64	30	3·3	—	37	43	7·8	6·3	38·0	50	5	1905
1906	65	32	4·7	—	36	50	10·8	13·3	42·7	40	0	1906
1907	65	36	1·3°N	—	37	46	9·2	15·7	40·7	50	15	1907
1908	65	33	2·0	—	37	45	14·4	12·3	41·3	55	15	1908
1909	65	32	1·3	—	40	47	9·2	8·7	41·3	50	15	1909
1910	63	32	1·5	—	38	49	8·0	17·3	47·3	55	7	1910
1911	65	35	1·3	—	39	49	8·6	17·5	43·3	47	18	1911
1912	55	27	0·7	—	40	46	9·2	12·5	40·0	47	9°E	1912
1913	59	31	0·5	—	38	43	12·8	17·7	38·3	25	27°E	1913
1914	64	25	3·5	—	36	40	8·8	17·5	37·3	50	5	1914
1915	60	33	2·3	—	37	60	9·4	18·3	39·3	45	27	1915
1916	63	33	1·5	—	38	47	15·0	18·5	39·5	47	8	1916
1917	50	29	3·0	—	33	51	15·4	21·0	37·0	45	15	1917
1918	52	23	2·3	—	34	47	13·0	16·5	43·5	38	12°E	1918
1919	60	32	0·3	—	34	55	10·2	18·7	37·7	65	25	1919
1920	62	31	1·3	—	38	48	17·2	18·3	37·7	52	10	1920
1921	60	31	2·0	—	36	46	7·6	14·5	37·3	50	5	1921
1922	61	30	2·5	—	32	59	12·4	19·3	37·3	52	27	1922
1923	63	32	1·3	—	35	50	6·8	19·0	36·3	55	15	1923
1924	64	29	0·0	—	38	49	12·8	19·3	36·5	48	22	1924
1925	67	28	1·0	—	35	47	7·0	18·0	46·5	42	5°E	1925
1926	59	30	3·5	—	36	50	14·0	17·0	39·3	40	2	1926
1927	62	33	0·3	—	36	50	6·2	18·7	42·5	53	20	1927
1928	63	31	1·3	—	37	48	6·6	18·0	40·3	43	0	1928
1929	53	22	2·5	—	34	47	13·4	18·0	36·7	40	5	1929

TABLE III(*b*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Siberian high pressure: Average latitude of highest pressure in 60, 70, 80, 90, 100, 110°E	Intertropical trough, Indian Ocean sector: Average latitude of lowest pressure in 60, 70, 80, 90, 100°E	Intertropical trough, Australian sector: Average latitude of lowest pressure in 110, 120, 130, 140°E	Subtropical high, Australia: Average latitude of highest pressure in 110, 120, 130, 140°E	Western North Atlantic trough: Longitude of lowest pressure at 45°N	Eastern North Atlantic ridge: Longitude of highest pressure at 45°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1930	62	35	5·0	—	38	48	11·8	17·5	37·5	15	10°E	1930
1931	62	29	2·3	—	35	49	10·6	16·7	37·0	58	22	1931
1932	65	32	2·3°N	—	33	44	15·6	20·3	41·0	40	2°E	1932
1933	67	30	1·5	—	33	56	8·0	18·5	38·3	45	2°E	1933
1934	64	32	2·3	—	35	49	12·4	18·7	41·7	45	0	1934
1935	67	41	1·0°N	—	37	47	15·2	17·0	38·0	52	16	1935
1936	52	27	1·0°N	—	35	47	10·6	14·3	44·3	32	12	1936
1937	62	32	1·0°N	—	39	51	10·8	16·7	37·5	25	—	1937
1938	63	30	0·0	—	35	51	7·2	12·7	39·0	42	5	1938
1939	53	27	0·5°N	—	39	47	8·2	15·0	42·0	42	7°E	1939
1940	51	23	0·5°N	—	38	65	9·8	17·7	41·5	45	3°E	1940
1941	51	25	0·5	—	40	44	10·4	14·7	42·0	47	5°E	1941
1942	54	33	1·7	—	36	50	6·8	14·7	37·0	60	18	1942
1943	58	29	0·7	32·0	35	56	9·0	16·0	37·7	38	6°E	1943
1944	64	28	0·3°N	27·8	38	48	5·2	15·3	38·0	45	0	1944
1945	55	29	0·3°N	31·2	39	50	7·8	14·5	38·3	58	10	1945
1946	63	32	1·0	32·4	35	45	7·8	15·3	36·5	50	3	1946
1947	61	29	1·7°N	29·8	30	52	9·0	16·3	39·0	42	2°E	1947
1948	57	30	2·5	33·6	37	44	8·6	14·7	42·0	50	22	1948
1949	67	36	0·5	32·0	37	48	6·6	14·5	39·3	50	15	1949
1950	63	33	3·7	33·6	35	47	6·0	16·5	37·5	38	2	1950
1951	61	32	3·0	33·2	32	51	12·2	17·3	46·5	57	0	1951
1952	63	34	4·3	32·8	37	47	10·4	15·7	39·3	58	25	1952
1953	65	35	1·7	29·8	30	45	6·4	11·7	37·7	80	10	1953
1954	64	35	1·0	27·8	37	49	3·2	15·5	40·3	53	12	1954
1955	53	24	0·3°N	32·0	40	46	4·4	14·3	35·3	46	10	1955
1956	63	27	2·3	25·8	40	53	5·0	15·3	36·7	58	32	1956
1957	65	31	3·3	29·8	40	46	7·8	15·7	34·3	48	0	1957
1958	64	26	0·5	31·0	32	49	8·4	16·3	36·7	55	10	1958
1959	53	27	0·0	30·8	37	48	7·0	18·0	40·5	52	7°E	1959
1960	54	25	0·5	27·6	40	49	12·4	19·7	37·7	40	0	1960
1961	60	29	1·5	33·0	25	48	5·6	11·0	37·5	56	—	1961
1962	63	32	2·7	30·6	25	49	5·8	18·7	39·3	55	10	1962
1963	42	25	2·5°N	29·6	28	51	4·2	15·7	36·2	23	26°E	1963

TABLE IV(*a*)—NORTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JULY, 10-YEAR MEAN VALUES, MB

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1786–95	*7·2*	*9·5*	4·4	—	—	—	—	2·5	1786–95
1787–96	*7·6*	*9·3*	3·6	—	—	—	—	3·1	1787–96
1788–97	*7·6*	*9·0*	3·2	—	—	—	—	2·9	1788–97
1789–98	*8·0*	*9·1*	2·9	—	—	—	—	3·1	1789–98
1790–99	8·1	8·9	3·1	—	—	—	—	3·1	1790–99
1791–1800	7·9	8·4	3·5	—	—	—	—	2·7	1791–1800
1792–1801	7·8	8·4	3·7	—	*4·1*	—	—	2·2	1792–1801
1793–1802	7·8	8·2	4·5	—	*4·2*	—	—	2·1	1793–1802
1794–1803	7·8	8·1	4·5	—	*3·9*	—	—	2·1	1794–1803
1795–1804	7·8	8·4	4·7	—	*3·7*	—	—	2·1	1795–1804
1796–1805	7·8	8·4	5·0	—	*3·5*	—	—	2·3	1796–1805
1797–1806	7·8	8·4	5·3	—	*3·5*	—	—	1·8	1797–1806
1798–1807	7·8	8·6	5·5	—	*3·6*	—	—	1·9	1798–1807
1799–1808	7·7	8·4	5·2	—	*3·6*	—	—	1·7	1799–1808
1800–09	7·5	8·5	5·0	—	*3·3*	—	—	1·2	1800–09
1801–10	7·6	8·9	4·2	—	*3·3*	—	—	1·4	1801–10
1802–11	7·7	8·9	4·4	—	*3·2*	—	—	1·3	1802–11
1803–12	7·7	9·2	4·3	—	*3·1*	—	—	0·8	1803–12
1804–13	7·6	9·1	4·3	—	*3·2*	—	—	0·7	1804–13
1805–14	7·5	8·8	4·5	—	*3·5*	—	—	0·3	1805–14
1806–15	7·4	8·7	4·7	—	*3·6*	—	—	0·1	1806–15
1807–16	7·6	8·7	4·1	—	*3·9*	—	—	0·4	1807–16
1808–17	7·6	8·6	4·1	—	*3·9*	—	—	0·4	1808–17
1809–18	7·7	8·8	5·0	—	*3·8*	—	—	0·0	1809–18
1810–19	7·9	8·6	5·3	—	*4·0*	—	—	−0·2	1810–19
1811–20	7·9	8·4	5·8	—	*4·0*	—	—	−0·7	1811–20
1812–21	7·7	8·2	6·1	—	*4·2*	—	—	−0·7	1812–21
1813–22	7·6	7·8	5·3	—	*4·1*	—	—	−0·5	1813–22
1814–23	7·5	7·5	5·1	—	*4·2*	—	—	−0·1	1814–23
1815–24	7·5	7·3	5·6	—	*4·4*	—	—	−0·2	1815–24
1816–25	7·5	7·3	5·3	—	*4·7*	—	—	−0·5	1816–25
1817–26	7·4	7·1	5·6	—	*4·5*	—	—	−0·4	1817–26
1818–27	7·6	6·9	6·1	—	*4·6*	—	—	−0·9	1818–27
1819–28	7·6	6·8	5·7	—	*4·5*	—	—	−0·7	1819–28
1820–29	7·7	6·9	5·8	—	*4·5*	—	—	−0·3	1820–29
1821–30	7·6	7·0	5·5	—	*4·0*	—	—	0·0	1821–30
1822–31	7·7	7·1	4·7	—	*3·4*	—	—	0·2	1822–31
1823–32	7·6	7·4	5·7	—	*3·0*	—	—	−0·1	1823–32
1824–33	7·9	7·9	5·9	—	*2·8*	—	—	−0·6	1824–33

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE IV(*a*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1825–34	7·9	8·1	4·6	—	*2·2*	—	—	−0·3	1825–34
1826–35	7·8	8·2	4·7	—	*1·7*	—	—	0·2	1826–35
1827–36	7·6	8·2	5·4	—	*1·4*	—	—	0·0	1827–36
1828–37	7·2	8·5	5·0	—	*1·0*	—	—	0·1	1828–37
1829–38	7·2	8·6	5·2	—	*0·9*	—	—	−0·1	1829–38
1830–39	7·0	8·6	5·2	—	*0·7*	—	—	−0·1	1830–39
1831–40	6·6	8·4	5·8	—	*0·7*	—	—	0·0	1831–40
1832–41	6·6	8·4	6·7	—	*1·1*	—	—	−0·1	1832–41
1833–42	6·7	8·4	6·2	—	*1·4*	—	—	0·1	1833–42
1834–43	6·5	8·5	6·6	—	*1·3*	—	—	0·1	1834–43
1835–44	6·8	8·7	7·8	—	*1·8*	—	—	−0·3	1835–44
1836–45	6·7	8·8	7·6	—	*2·3*	—	—	−0·3	1836–45
1837–46	6·9	8·9	7·2	—	*2·6*	—	—	−0·1	1837–46
1838–47	7·1	8·6	7·3	—	*3·0*	—	—	−0·3	1838–47
1839–48	6·9	8·4	7·4	—	*3·1*	—	—	−0·2	1839–48
1840–49	7·0	8·3	7·5	—	*3·2*	—	—	−0·3	1840–49
1841–50	7·4	8·4	6·8	—	*3·6*	5·3	—	−0·3	1841–50
1842–51	7·3	8·6	6·5	—	*3·5*	5·4	—	−0·3	1842–51
1843–52	7·3	8·7	6·0	—	*3·6*	5·3	—	−0·1	1843–52
1844–53	7·3	8·5	5·6	—	*3·9*	5·0	—	0·3	1844–53
1845–54	6·8	8·0	5·1	—	*3·7*	5·0	—	0·8	1845–54
1846–55	7·1	7·7	4·9	4·4	*3·5*	4·8	—	0·8	1846–55
1847–56	6·7	7·7	5·0	4·4	*3·4*	4·8	—	0·6	1847–56
1848–57	6·7	7·6	5·2	4·4	*3·3*	4·7	—	0·8	1848–57
1849–58	6·6	7·5	5·0	4·3	*3·2*	4·5	—	0·7	1849–58
1850–59	6·3	7·5	5·2	4·3	*3·2*	4·6	—	0·7	1850–59
1851–60	6·5	7·7	5·2	4·3	*3·2*	4·7	—	0·4	1851–60
1852–61	6·8	7·9	4·7	4·3	*3·5*	4·6	—	0·9	1852–61
1853–62	7·0	7·8	5·7	4·2	*3·6*	4·8	*3·1*	0·9	1853–62
1854–63	7·0	7·7	6·0	4·2	*3·5*	5·0	*3·2*	0·4	1854–63
1855–64	7·4	7·9	6·4	4·5	*3·5*	5·1	*3·0*	0·1	1855–64
1856–65	7·4	8·0	6·8	4·5	*3·6*	5·1	*3·1*	0·2	1856–65
1857–66	7·5	8·0	6·8	4·4	*3·7*	5·1	*3·1*	0·0	1857–77
1858–67	7·6	8·2	6·5	4·5	*3·7*	5·3	*3·3*	−0·1	1858–67
1859–68	7·2	8·0	6·2	4·4	*3·7*	5·4	*3·2*	−0·1	1859–68
1860–69	7·4	8·2	6·0	4·5	*3·7*	5·3	*3·4*	0·1	1860–69
1861–70	7·2	8·0	5·9	4·5	*3·7*	5·2	*3·7*	0·2	1861–70
1862–71	7·0	7·6	6·2	4·6	*3·5*	5·0	*3·6*	−0·2	1862–71
1863–72	6·9	7·6	5·2	4·5	*3·5*	4·9	*3·5*	−0·4	1863–72
1864–73	7·0	7·6	4·7	4·4	*3·5*	4·9	*3·6*	0·1	1864–73

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE IV(*a*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1865–74	6·9	7·5	4·0	4·4	*3·6*	4·8	*3·8*	0·4	1865–74
1866–75	6·8	7·8	3·6	4·4	*3·6*	4·9	*4·0*	0·1	1866–75
1867–76	6·8	7·9	3·7	4·5	*3·4*	5·1	*4·3*	0·3	1867–76
1868–77	6·7	7·9	3·7	4·5	*3·4*	5·0	*4·2*	0·5	1868–77
1869–78	7·5	8·4	4·2	4·7	*3·5*	5·1	*4·3*	0·1	1869–78
1870–79	7·7	8·4	4·2	4·7	*3·6*	5·0	4·8	−0·1	1870–79
1871–80	7·8	8·5	4·2	4·6	*3·8*	5·1	4·6	0·1	1871–80
1872–81	8·1	8·8	4·5	4·3	*4·0*	5·2	4·6	0·0	1872–81
1873–82	8·5	8·9	4·6	4·5	*4·0*	5·5	4·5	0·5	1873–82
1874–83	8·1	8·9	5·0	4·5	*4·0*	5·6	4·4	0·2	1874–83
1875–84	7·9	9·3	5·0	4·4	*4·0*	5·7	4·4	0·2	1875–84
1876–85	7·8	9·0	5·1	4·3	4·1	5·9	4·1	0·3	1876–85
1877–86	8·1	9·2	4·9	4·2	4·4	5·8	4·0	0·3	1877–86
1878–87	8·2	9·2	4·8	4·1	4·6	5·9	4·2	0·3	1878–87
1879–88	8·1	9·4	4·6	4·0	4·9	5·9	4·2	0·7	1879–88
1880–89	7·8	9·3	4·8	4·0	4·9	6·2	3·9	0·5	1880–89
1881–90	7·7	9·4	5·4	4·1	4·9	6·2	4·0	0·4	1881–90
1882–91	6·7	8·8	5·0	4·2	4·9	6·4	4·1	0·4	1882–91
1883–92	6·2	8·7	5·4	4·2	5·1	6·2	4·3	−0·2	1883–92
1884–93	6·6	9·1	5·0	4·2	5·3	6·0	4·2	−0·3	1884–93
1885–94	7·0	9·1	5·2	4·3	5·4	6·1	4·3	−0·4	1885–94
1886–95	6·9	8·9	5·7	4·3	5·2	5·9	4·0	−0·3	1886–95
1887–96	7·1	8·8	5·5	4·4	5·1	5·9	3·6	−0·5	1887–96
1888–97	6·9	8·4	5·8	4·5	5·0	5·9	3·3	−0·8	1888–97
1889–98	6·4	7·8	6·6	4·6	4·9	6·0	3·3	−1·2	1889–98
1890–99	6·4	7·8	6·3	4·6	5·0	5·8	2·9	−1·1	1890–99
1891–1900	6·8	7·8	5·8	4·7	4·8	5·9	3·1	−1·1	1891–1900
1892–1901	7·6	8·4	5·4	4·8	4·9	6·0	2·9	−1·2	1892–1901
1893–1902	8·0	8·5	5·9	4·9	4·9	6·3	2·8	−1·2	1893–1902
1894–1903	8·2	8·4	6·2	5·0	4·8	6·6	2·9	−1·1	1894–1903
1895–1904	8·2	8·0	6·4	5·1	4·8	6·7	2·6	−1·1	1895–1904
1896–1905	8·6	8·4	6·5	5·3	5·1	6·9	3·0	−1·4	1896–1905
1897–1906	8·3	8·3	6·6	5·3	5·2	6·9	3·0	−1·2	1897–1906
1898–1907	8·6	9·0	6·5	5·3	5·3	7·0	2·9	−1·3	1898–1907
1899–1908	9·1	9·2	5·6	5·4	5·4	7·1	2·8	−0·9	1899–1908
1900–09	9·6	9·4	6·4	5·4	5·4	7·4	3·3	−1·0	1900–09
1901–10	9·6	9·6	6·4	5·4	5·5	7·2	3·2	−1·3	1901–10
1902–11	9·5	9·4	7·0	5·4	5·5	7·0	3·5	−1·3	1902–11
1903–12	9·1	9·3	5·5	5·3	5·4	6·8	3·5	−0·9	1903–12
1904–13	8·9	9·3	5·6	5·3	5·4	6·9	3·3	−1·3	1904–13

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE IV(*a*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1905–14	8·9	9·7	5·2	5·3	5·5	6·8	3·6	−1·4	1905–14
1906–15	8·8	9·7	5·0	5·3	5·4	6·6	3·6	−1·2	1906–15
1907–16	8·8	9·6	5·2	5·2	5·4	6·5	3·8	−1·3	1907–16
1908–17	8·6	9·3	4·9	5·2	5·4	6·4	4·1	−1·2	1908–17
1909–18	8·1	8·8	5·0	4·9	5·4	6·2	4·1	−1·0	1909–18
1910–19	7·8	8·7	4·5	5·0	5·6	6·1	3·9	−1·2	1910–19
1911–20	7·6	8·6	4·5	5·1	5·6	6·3	4·1	−0·6	1911–20
1912–21	7·8	8·7	4·7	5·1	5·6	6·3	4·0	−0·6	1912–21
1913–22	8·1	8·7	5·8	5·1	5·9	6·3	4·2	−0·6	1913–22
1914–23	8·4	8·8	5·8	5·1	6·2	6·3	4·5	−0·1	1914–23
1915–24	8·3	8·8	6·2	5·1	6·3	6·3	4·8	0·0	1915–24
1916–25	8·3	8·8	5·7	5·1	6·5	6·2	4·8	0·1	1916–25
1917–26	8·4	9·0	5·5	5·2	6·6	6·3	5·0	0·0	1917–26
1918–27	8·2	8·9	5·2	5·3	6·8	6·3	5·2	0·3	1918–27
1919–28	8·6	9·6	5·9	5·6	6·7	6·4	5·2	0·0	1919–28
1920–29	8·4	9·6	5·9	5·6	6·6	6·4	5·5	0·4	1920–29
1921–30	8·1	9·5	6·1	5·5	6·6	6·2	5·3	0·0	1921–30
1922–31	8·2	9·6	5·8	5·5	6·7	6·2	5·1	0·3	1922–31
1923–32	7·9	9·9	5·3	5·4	6·5	6·1	4·8	0·2	1923–32
1924–33	7·8	9·7	5·4	5·4	6·4	5·8	4·8	0·1	1924–33
1925–34	7·9	9·8	5·7	5·3	6·3	5·6	4·3	−0·1	1925–34
1926–35	8·0	9·7	6·6	5·3	6·3	5·9	4·4	−0·5	1926–35
1927–36	8·0	9·9	6·6	5·3	6·5	5·7	4·4	−0·7	1927–36
1928–37	8·3	9·9	7·0	5·2	6·1	5·7	4·3	−0·9	1928–37
1929–38	8·3	9·8	6·1	5·2	6·3	5·6	4·3	−0·5	1929–38
1930–39	8·4	9·7	5·8	5·1	6·2	5·6	4·0	−0·1	1930–39
1931–40	8·6	9·5	5·7	4·8	6·4	5·7	4·4	0·0	1931–40
1932–41	8·3	9·4	5·2	4·8	6·3	5·7	4·5	−0·1	1932–41
1933–42	8·3	9·1	5·9	4·8	6·3	5·8	4·8	−0·3	1933–42
1934–43	8·2	9·1	5·6	4·7	6·2	6·0	4·7	−0·4	1934–43
1935–44	7·8	8·7	5·0	4·6	6·3	6·2	5·0	−0·2	1935–44
1936–45	7·6	8·7	4·5	4·7	6·3	6·2	4·8	0·0	1936–45
1937–46	7·6	8·5	4·4	4·7	6·2	6·6	4·5	0·6	1937–46
1938–47	7·7	8·6	4·3	4·8	6·5	6·5	4·6	0·8	1938–47
1939–48	7·3	8·5	4·6	4·8	6·5	6·6	4·6	0·4	1939–48
1940–49	7·3	8·4	4·8	4·6	6·7	6·5	4·5	−0·2	1940–49
1941–50	7·4	8·4	4·5	4·8	6·4	6·6	4·1	−0·3	1941–50
1942–51	7·5	8·4	5·3	4·8	6·3	6·7	4·4	−0·6	1942–51
1943–52	7·1	8·1	5·1	4·8	6·2	6·6	3·9	−0·7	1943–52
1944–53	7·2	8·1	5·4	4·7	6·3	6·6	4·0	−0·4	1944–53

TABLE IV(*a*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1945–54	7·4	8·4	6·2	4·8	6·3	6·5	3·4	−0·5	1945–54
1946–55	7·5	8·3	5·9	4·6	5·7	6·3	3·7	−0·7	1946–55
1947–56	7·5	8·3	5·8	4·7	5·6	6·1	3·7	−0·9	1947–56
1948–57	7·2	8·5	6·1	4·5	5·4	6·2	3·5	−1·0	1948–57
1949–58	7·7	8·5	6·1	4·5	5·3	6·2	3·4	−0·8	1949–58
1950–59	7·9	8·4	5·7	4·7	5·3	6·2	3·7	−0·5	1950–59
1951–60	8·0	8·7	5·9	4·8	5·5	6·0	3·8	−0·3	1951–60
1952–61	7·9	8·6	6·1	4·8	5·5	6·1	3·8	−0·4	1952–61
1953–62	7·9	8·9	5·9	4·9	5·3	6·3	4·1	−0·4	1953–62
1954–63	7·4	8·7	5·5	5·2	5·1	6·3	4·2	−0·5	1954–63

TABLE IV(*b*)—NORTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JULY, VALUES FOR EACH JULY, MB

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–25°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1750	—	—	9	—	—	—	—	2	1750
1751	—	—	7	—	—	—	—	2	1751
1752	—	—	3	—	—	—	—	5	1752
1753	—	—	10	—	—	—	—	0	1753
1754	—	—	6	—	—	—	—	2	1754
1755	—	—	10	—	—	—	—	0	1755
1756	—	—	3	—	—	—	—	1	1756
1757	—	—	1	—	—	—	—	4	1757
1758	—	—	5	—	—	—	—	1	1758
1759	—	—	10	—	—	—	—	−1	1759
1760	—	—	11	—	—	—	—	−3	1760
1761	—	—	12	—	—	—	—	0	1761
1762	—	—	12	—	—	—	—	0	1762
1763	—	—	7	—	—	—	—	3	1763
1764	—	—	3	—	—	—	—	4	1764
1765	—	—	12	—	—	—	—	−3	1765
1766	—	—	3	—	—	—	—	2	1766
1767	—	—	5	—	—	—	—	3	1767
1768	—	—	5	—	—	—	—	2	1768
1769	—	—	9	—	—	—	—	1	1769
1770	—	—	8	—	—	—	—	1	1770
1771	—	—	12	—	—	—	—	−3	1771
1772	—	—	7	—	—	—	—	1	1772
1773	—	—	5	—	—	—	—	0	1773
1774	—	—	8	—	—	—	—	3	1774
1775	—	—	2	—	—	—	—	5	1775
1776	—	—	5	—	—	—	—	3	1776
1777	—	—	9	—	—	—	—	1	1777
1778	—	—	8	—	—	—	—	2	1778
1779	—	—	4	—	—	—	—	0	1779
1780	—	—	6	—	—	—	—	4	1780
1781	—	—	8	—	—	—	—	1	1781
1782	—	—	9	—	—	—	—	2	1782
1783	—	—	4	—	—	—	—	2	1783
1784	—	—	10	—	—	—	—	2	1784

TABLE IV(*b*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1785	—	—	4	—	—	—	—	3	1785
1786	—	—	11	—	—	—	—	−1	1786
1787	—	—	7	—	—	—	—	3	1787
1788	—	—	5	—	—	—	—	3	1788
1789	—	—	1	—	—	—	—	4	1789
1790	—	—	7	—	—	—	—	4	1790
1791	—	—	2	—	—	—	—	5	1791
1792	—	—	2	—	—	—	—	4	1792
1793	—	—	5	—	—	—	—	1	1793
1794	—	—	1	—	—	—	—	3	1794
1795	—	—	3	—	—	—	—	−1	1795
1796	—	—	3	—	—	—	—	5	1796
1797	—	—	3	—	—	—	—	1	1797
1798	—	—	2	—	—	—	—	5	1798
1799	—	—	3	—	—	—	—	4	1799
1800	—	—	11	—	—	—	—	0	1800
1801	—	—	4	—	—	—	—	0	1801
1802	—	—	10	—	—	—	—	3	1802
1803	—	—	5	—	—	—	—	1	1803
1804	—	—	3	—	—	—	—	3	1804
1805	—	—	6	—	—	—	—	1	1805
1806	—	—	6	—	—	—	—	0	1806
1807	—	—	5	—	—	—	—	2	1807
1808	—	—	−1	—	—	—	—	3	1808
1809	—	—	1	—	—	—	—	−1	1809
1810	—	—	3	—	—	—	—	2	1810
1811	—	—	6	—	—	—	—	−1	1811
1812	—	—	9	—	—	—	—	−2	1812
1813	—	—	5	—	—	—	—	0	1813
1814	—	—	5	—	—	—	—	−1	1814
1815	—	—	8	—	—	—	—	−1	1815
1816	—	—	0	—	—	—	—	3	1816
1817	—	—	5	—	—	—	—	2	1817
1818	—	—	8	—	—	—	—	−1	1818
1819	—	—	4	—	—	—	—	−3	1819
1820	—	—	8	—	—	—	—	−3	1820
1821	—	—	9	—	—	—	—	−1	1821
1822	—	—	1	—	—	—	—	0	1822
1823	—	—	3	—	—	—	—	4	1823
1824	—	—	10	—	—	—	—	−2	1824

TABLE IV(*b*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W European	North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1825	—	—	5	—	—	—	—	−4	1825
1826	—	—	3	—	—	—	—	2	1826
1827	—	—	10	—	—	—	—	−1	1827
1828	—	—	4	—	—	—	—	1	1828
1829	—	—	5	—	—	—	—	1	1829
1830	—	—	5	—	—	—	—	0	1830
1831	—	—	1	—	—	—	—	1	1831
1832	—	—	11	—	—	—	—	−3	1832
1833	—	—	5	—	—	—	—	−1	1833
1834	—	—	−3	—	—	—	—	1	1834
1835	—	—	6	—	—	—	—	1	1835
1836	—	—	10	—	—	—	—	0	1836
1837	—	—	6	—	—	—	—	0	1837
1838	—	—	6	—	—	—	—	−1	1838
1839	—	—	5	—	—	—	—	1	1839
1840	—	—	11	—	—	—	—	1	1840
1841	—	—	10	—	—	—	—	0	1841
1842	—	—	6	—	—	—	—	−1	1842
1843	—	—	9	—	—	—	—	−1	1843
1844	—	—	9	—	—	—	—	−3	1844
1845	—	—	4	—	—	—	—	1	1845
1846	—	—	6	—	—	—	—	2	1846
1847	—	—	7	—	—	—	—	−2	1847
1848	—	—	7	—	—	—	—	0	1848
1849	—	—	6	—	—	—	—	0	1849
1850	—	—	4	—	—	5	—	1	1850
1851	—	—	7	—	—	7	—	0	1851
1852	—	—	1	—	—	4	—	1	1852
1853	—	—	5	—	—	3	—	3	1853
1854	—	—	4	—	—	5	—	2	1854
1855	—	—	2	—	—	4	—	1	1855
1856	—	—	7	—	—	5	—	0	1856
1857	—	—	9	—	—	4	—	0	1857
1858	—	—	5	—	—	3	—	−1	1858
1859	—	—	7	—	—	6	—	0	1859
1860	—	—	5	5	—	6	—	−2	1860
1861	—	—	2	5	—	6	—	5	1861
1862	—	—	11	4	—	6	—	1	1862
1863	—	—	8	5	—	5	—	−2	1863
1864	—	—	8	5	—	6	—	−1	1864

TABLE IV(*b*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1865	8	7	6	4	—	4	—	2	1865
1866	6	8	7	4	—	5	—	−2	1866
1867	8	8	6	5	—	6	—	−1	1867
1868	2	5	2	3	—	4	—	−1	1868
1869	7	10	5	5	—	5	—	2	1869
1870	7	8	4	5	—	5	—	−1	1870
1871	7	7	5	6	—	4	—	1	1871
1872	8	9	1	3	—	5	—	−1	1872
1873	8	7	3	4	—	5	5	3	1873
1874	8	6	1	5	—	5	4	2	1874
1875	7	10	2	4	—	5	6	−1	1875
1876	6	9	8	5	2	7	7	0	1876
1877	7	8	6	5	4	5	4	1	1877
1878	10	10	7	5	3	5	5	−5	1878
1879	9	10	5	5	4	4	7	0	1879
1880	8	9	4	4	6	6	1	1	1880
1881	10	10	8	3	5	5	3	0	1881
1882	12	10	2	5	4	8	3	4	1882
1883	4	7	7	4	4	6	4	0	1883
1884	6	10	1	4	4	6	4	2	1884
1885	6	7	3	3	5	7	3	0	1885
1886	9	11	6	4	5	6	6	0	1886
1887	8	8	5	4	6	6	6	1	1887
1888	9	12	5	4	6	5	5	−1	1888
1889	6	9	7	5	4	7	4	−2	1889
1890	7	10	10	5	6	6	2	0	1890
1891	0	4	4	4	5	7	4	0	1891
1892	7	9	6	5	6	6	5	−2	1892
1893	8	11	3	4	6	4	3	−1	1893
1894	10	10	3	5	5	7	5	1	1894
1895	5	5	8	3	3	5	0	1	1895
1896	11	10	4	5	4	6	2	−2	1896
1897	6	4	8	5	5	6	3	−2	1897
1898	4	6	13	5	5	6	5	−5	1898
1899	6	9	4	5	5	5	0	−1	1899
1900	11	10	5	6	4	7	4	0	1900
1901	8	10	0	5	6	8	2	−1	1901
1902	11	10	11	6	6	9	4	−2	1902
1903	10	10	6	5	5	7	4	0	1903
1904	10	6	5	6	5	8	2	1	1904

TABLE IV(*b*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1905	9	9	9	5	6	7	4	−2	1905
1906	8	9	5	5	5	6	2	0	1906
1907	9	11	7	5	6	7	2	−3	1907
1908	9	8	4	6	6	7	4	−1	1908
1909	11	11	12	5	5	8	5	−2	1909
1910	11	12	5	6	5	5	3	−3	1910
1911	7	8	6	5	6	6	5	−1	1911
1912	7	9	−4	5	5	7	4	2	1912
1913	8	10	7	5	5	8	2	−4	1913
1914	10	10	1	6	6	7	5	0	1914
1915	8	9	7	5	5	5	4	0	1915
1916	8	8	7	4	5	5	4	−1	1916
1917	7	8	4	5	6	6	5	−2	1917
1918	4	3	5	3	6	5	4	1	1918
1919	8	10	7	6	7	7	3	−4	1919
1920	9	11	5	7	5	7	5	3	1920
1921	9	9	8	5	6	6	4	−1	1921
1922	10	9	7	5	8	7	6	2	1922
1923	11	11	7	5	8	8	5	1	1923
1924	9	10	5	6	7	7	8	1	1924
1925	8	9	2	5	7	4	4	1	1925
1926	9	10	5	5	6	6	6	−2	1926
1927	5	7	1	6	8	6	7	1	1927
1928	8	10	12	6	5	6	4	−2	1928
1929	6	10	7	6	6	7	6	0	1929
1930	6	10	7	6	5	5	3	−1	1930
1931	10	10	5	5	7	6	2	2	1931
1932	7	12	2	4	6	6	3	1	1932
1933	10	9	8	5	7	5	5	0	1933
1934	10	11	8	5	6	5	3	−1	1934
1935	9	8	11	5	7	7	5	−3	1935
1936	9	12	5	5	8	4	6	−4	1936
1937	8	7	5	5	4	6	6	−1	1937
1938	8	9	3	6	7	5	4	2	1938
1939	7	9	4	5	5	7	3	4	1939
1940	8	8	6	3	7	6	7	0	1940
1941	7	9	0	5	6	6	3	1	1941
1942	7	9	9	4	6	7	6	−1	1942
1943	9	9	5	4	6	7	4	−1	1943
1944	6	7	2	4	7	7	6	1	1944

TABLE IV(*b*)—*continued*

	North Atlantic Westerlies: Pressure difference 40–50°N at 40°W	Newfoundland Banks South-westerlies: Pressure difference 35°N 45°W–45°N 55°W	European North-westerlies: Pressure difference 50°N 0°E–60°N 15°E	North Atlantic Trades: Pressure difference 25–15°N at 60°W	North Atlantic Trades: Pressure difference 30–20°N at 20°W	Monsoon Current (India): Pressure difference 10–20°N at 75°E	China Sea South-westerlies: Pressure difference 35°N 135°E–45°N 125°E	North Sea Southerlies: Pressure difference 10–0°E at 55°N	
1945	7	8	6	6	7	7	3	−1	1945
1946	9	10	4	5	7	8	3	2	1946
1947	9	8	4	6	7	5	7	1	1947
1948	4	8	6	6	7	6	4	−2	1948
1949	7	8	6	3	7	6	2	−2	1949
1950	9	8	3	5	4	7	3	−1	1950
1951	8	9	8	5	5	7	6	−2	1951
1952	3	6	7	4	5	6	1	−2	1952
1953	10	9	8	3	7	7	5	2	1953
1954	8	10	10	5	7	6	0	0	1954
1955	8	7	3	4	1	5	6	−3	1955
1956	9	10	3	6	6	6	3	0	1956
1957	6	10	7	4	5	6	5	0	1957
1958	9	8	6	6	6	6	3	0	1958
1959	9	7	2	5	7	6	5	1	1959
1960	10	11	5	6	6	5	4	1	1960
1961	7	8	10	5	5	8	6	−3	1961
1962	3	9	5	5	3	8	4	−2	1962
1963	5	7	4	6	5	7	6	1	1963

TABLE V(*a*)—SOUTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JULY, 10-YEAR MEAN VALUES, MB

	South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies: (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1860–69	—	*5·5*	1·7	1895–1904	2·2	5·3	3·5
1861–70	—	*5·6*	1·6	1896–1905	2·1	4·9	3·7
1862–71	—	*5·6*	1·8	1897–1906	2·0	4·7	4·2
1863–72	—	*5·8*	1·8	1898–1907	2·0	4·7	4·0
1864–73	—	*5·7*	1·9	1899–1908	2·0	4·9	3·8
1865–74	—	*5·7*	2·5	1900–09	2·1	5·2	3·8
1866–75	—	*5·5*	3·2	1901–10	2·2	5·6	3·2
1867–76	—	*5·7*	3·3	1902–11	2·3	5·5	2·9
1868–77	—	*5·4*	3·2	1903–12	2·3	5·6	2·2
1869–78	—	*5·5*	3·5	1904–13	2·3	5·6	2·3
1870–79	—	*5·6*	3·6	1905–14	2·3	5·7	2·4
1871–80	—	*5·7*	3·7	1906–15	2·4	6·3	2·4
1872–81	—	*5·7*	3·4	1907–16	2·2	6·6	1·9
1873–82	—	*5·6*	3·1	1908–17	2·2	7·1	1·9
1874–83	—	*5·5*	2·9	1909–18	2·2	6·7	1·9
1875–84	—	*5·5*	2·6	1910–19	2·3	6·3	2·0
1876–85	—	*5·5*	2·0	1911–20	2·3	6·6	2·3
1877–86	—	*5·4*	2·2	1912–21	2·2	6·6	2·7
1878–87	—	*5·5*	2·5	1913–22	2·1	6·5	2·9
1879–88	—	*5·4*	2·2	1914–23	2·0	6·1	2·8
1880–89	—	*5·2*	2·1	1915–24	2·1	6·4	2·7
1881–90	—	*5·0*	2·0	1916–25	2·2	6·1	2·3
1882–91	—	*4·9*	1·8	1917–26	2·5	5·6	2·2
1883–92	—	*4·7*	2·4	1918–27	2·6	5·1	1·9
1884–93	—	*4·9*	2·6	1919–28	2·8	5·3	1·8
1885–94	—	*5·1*	2·9	1920–29	2·7	5·6	1·6
1886–95	—	*5·2*	2·9	1921–30	2·7	5·1	1·5
1887–96	—	*5·3*	2·7	1922–31	2·7	4·7	1·4
1888–97	—	*5·4*	2·8	1923–32	2·6	4·0	1·4
1889–98	—	5·4	3·1	1924–33	2·5	4·3	1·1
1890–99	—	5·6	3·1	1925–34	2·3	4·8	1·0
1891–1900	—	5·2	3·4	1926–35	2·2	4·6	1·3
1892–1901	2·5	5·5	3·6	1927–36	2·0	4·9	1·3
1893–1902	2·4	5·8	3·5	1928–37	1·8	4·8	1·5
1894–1903	2·4	5·9	3·6	1929–38	1·4	5·0	1·6

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE V(*a*)—*continued*

	South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1930–39	1·4	4·3	1·6	1945–54	2·9	5·5	2·4
1931–40	1·3	4·5	1·5	1946–55	3·1	5·2	2·1
1932–41	1·3	4·5	1·2	1947–56	3·3	5·6	2·0
1933–42	1·4	5·0	1·5	1948–57	3·3	5·5	2·0
1934–43	1·5	4·9	1·6	1949–58	3·2	5·6	2·0
1935–44	1·5	4·2	1·6	1950–59	3·3	5·3	1·7
1936–45	1·6	4·7	1·5	1951–60	3·4	5·4	1·8
1937–46	1·7	4·4	1·7	1952–61	3·4	5·3	1·6
1938–47	1·9	4·6	1·6	1953–62	3·4	5·1	1·7
1939–48	2·1	4·3	1·4	1954–63	3·2	5·1	1·2
1940–49	2·1	4·9	1·8				
1941–50	2·1	5·1	2·0				
1942–51	2·2	5·3	2·4				
1943–52	2·3	5·4	2·2				
1944–53	2·6	5·4	2·3				

TABLE V(*b*)—SOUTHERN HEMISPHERE CIRCULATION INTENSITY INDICES IN JULY, VALUES FOR EACH JULY, MB

	South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies: (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1860	—	—	3	1900	2	1	5
1861	—	—	4	1901	2	7	3
1862	—	—	3	1902	3	7	5
1863	—	—	1	1903	3	7	3
1864	—	—	−2	1904	2	1	3
1865	—	—	1	1905	1	2	4
1866	—	—	1	1906	2	5	7
1867	—	—	2	1907	2	5	3
1868	—	—	2	1908	2	7	3
1869	—	—	2	1909	2	10	2
1870	—	—	2	1910	3	5	−1
1871	—	—	6	1911	3	6	0
1872	—	—	3	1912	3	8	−2
1873	—	—	2	1913	3	7	4
1874	—	—	4	1914	2	2	4
1875	—	—	8	1915	2	8	4
1876	—	—	2	1916	0	8	2
1877	—	—	1	1917	2	10	3
1878	—	—	5	1918	2	3	3
1879	—	—	3	1919	3	6	3
1880	—	—	3	1920	3	8	2
1881	—	—	3	1921	2	6	4
1882	—	—	0	1922	2	7	0
1883	—	—	0	1923	2	3	3
1884	—	—	1	1924	3	5	3
1885	—	—	2	1925	3	5	0
1886	—	—	4	1926	3	3	1
1887	—	—	4	1927	3	5	0
1888	—	—	2	1928	4	5	2
1889	—	5	2	1929	2	9	1
1890	—	5	2	1895	2	6	2
1891	—	4	1	1896	3	7	2
1892	4	4	6	1897	2	5	5
1893	3	6	2	1898	2	5	5
1894	4	7	4	1899	1	7	2

TABLE V(*b*)—*continued*

	South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E		South Atlantic Trades: Pressure difference 15–5°S at 0°E	Southern Westerlies (Chile): Pressure difference 45–50°S at 75°W	Southern Westerlies (New Zealand): Pressure difference 40–45°S at 172°E
1930	3	3	1	1950	2	7	2
1931	2	2	3	1951	3	4	4
1932	1	0	0	1952	3	6	1
1933	1	6	0	1953	5	5	2
1934	1	10	2	1954	4	4	3
1935	2	3	3	1955	5	5	−1
1936	1	6	1	1956	4	7	2
1937	1	4	2	1957	3	5	1
1938	0	7	3	1958	1	5	1
1939	2	2	1	1959	3	5	2
1940	2	5	0	1960	3	8	3
1941	2	2	0	1961	3	3	2
1942	2	5	3	1962	3	4	2
1943	2	5	1	1963	3	5	−3
1944	1	3	2				
1945	3	8	2				
1946	2	3	3				
1947	3	6	1				
1948	2	4	1				
1949	2	8	5				

TABLE VI(*a*)—POSITION INDICES IN JULY, 10-YEAR MEAN VALUES

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1786–95	*62·4*	*32·4*	—	—	—	—	—	—	—	*69·7*	*37·7*	1786–95
1787–96	*62·0*	*32·5*	—	—	—	—	—	—	—	*70·0*	*39·3*	1787–96
1788–97	*62·4*	*33·3*	—	—	—	—	—	—	—	*69·7*	*34·5*	1788–97
1789–98	*62·1*	*33·5*	—	—	—	—	—	—	—	*69·2*	*35·1*	1789–98
1790–99	61·8	34·0	—	—	—	—	—	—	—	69·6	36·2	1790–99
1791–1800	61·9	34·6	—	—	—	—	—	—	—	69·1	32·7	1791–1800
1792–1801	61·6	34·6	—	—	—	—	—	—	—	69·6	33·6	1792–1801
1793–1802	61·3	34·9	—	—	—	—	—	—	—	70·6	33·9	1793–1802
1794–1803	61·5	35·2	—	—	—	—	—	—	—	70·4	27·8	1794–1803
1795–1804	61·2	35·5	—	—	—	—	—	—	—	70·7	26·6	1795–1804
1796–1805	61·5	35·7	—	—	—	—	—	—	—	70·2	23·9	1796–1805
1797–1806	61·3	35·6	—	—	—	—	—	—	—	69·2	23·7	1797–1806
1798–1807	60·4	35·2	—	—	—	—	—	—	—	69·5	29·3	1798–1807
1799–1808	60·6	35·3	—	—	—	—	—	—	—	69·0	27·3	1799–1808
1800–09	60·7	35·0	—	—	—	—	—	—	—	67·6	25·0	1800–09
1801–10	60·5	34·5	—	—	—	—	—	—	—	66·4	26·7	1801–10
1802–11	60·8	34·8	—	—	—	—	—	—	—	66·4	22·8	1802–11
1803–12	61·1	34·7	—	—	—	—	—	—	—	65·1	19·4	1803–12
1804–13	60·2	34·6	—	—	—	—	—	—	—	65·4	21·0	1804–13
1805–14	60·5	34·7	—	—	—	—	—	—	—	66·6	20·5	1805–14
1806–15	60·4	35·1	—	—	—	—	—	—	—	67·1	19·4	1806–15
1807–16	60·2	34·7	—	—	—	—	—	—	—	66·1	17·1	1807–16
1808–17	60·8	34·9	—	—	—	—	—	—	—	65·6	17·3	1808–17
1809–18	60·7	34·8	—	—	—	—	—	—	—	65·1	15·3	1809–18
1810–19	60·7	35·2	—	—	—	—	—	—	—	65·3	13·1	1810–19
1811–20	60·9	35·4	—	—	—	—	—	—	—	67·7	11·4	1811–20
1812–21	60·3	35·4	—	—	—	—	—	—	—	67·2	13·2	1812–21
1813–22	60·3	35·4	—	—	—	—	—	—	—	69·5	17·3	1813–22
1814–23	60·5	35·5	—	—	—	—	—	—	—	69·7	20·8	1814–23
1815–24	59·7	35·4	—	—	—	—	—	—	—	68·2	20·3	1815–24
1816–25	59·9	35·1	—	—	—	—	—	—	—	67·2	19·4	1816–25
1817–26	61·1	35·7	—	—	—	—	—	—	—	67·9	14·9	1817–26
1818–27	61·3	35·9	—	—	—	—	—	—	—	67·9	11·4	1818–27
1819–28	60·8	35·4	—	—	—	—	—	—	—	69·1	16·1	1819–28

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE VI(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure: in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean: Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1820–29	61·1	35·2	—	—	—	—	—	—	—	69·2	19·5	1820–29
1821–30	61·2	35·0	—	—	—	—	—	—	—	68·7	22·0	1821–30
1822–31	61·8	34·6	—	—	—	—	—	—	—	66·2	17·2	1822–31
1823–32	61·7	34·2	—	—	—	—	—	—	—	64·2	13·3	1823–32
1824–33	61·9	34·3	—	—	—	—	—	—	—	62·7	8·8	1824–33
1825–34	62·7	34·7	—	—	—	—	—	—	—	64·2	4·8	1825–34
1826–35	62·5	34·8	—	—	—	—	—	—	—	65·2	7·6	1826–35
1827–36	62·5	35·1	—	—	—	—	—	—	—	66·7	15·4	1827–36
1828–37	62·4	34·7	—	—	—	—	—	—	—	66·0	17·2	1828–37
1829–38	62·9	35·4	—	—	—	—	—	—	—	65·3	12·5	1829–38
1830–39	62·5	35·7	—	—	—	—	—	—	—	66·3	13·2	1830–39
1831–40	62·4	35·6	—	—	—	—	—	—	—	65·0	14·0	1831–40
1832–41	62·7	36·2	—	—	—	—	—	—	—	67·7	20·0	1832–41
1833–42	63·0	36·7	—	—	—	—	—	—	—	67·4	22·5	1833–42
1834–43	63·6	36·6	—	—	—	—	—	—	—	67·8	25·5	1834–43
1835–44	63·0	36·1	—	—	—	—	—	—	—	67·1	28·4	1835–44
1836–45	62·5	35·4	—	—	—	—	—	—	—	66·8	29·0	1836–45
1837–46	62·1	35·1	—	—	—	—	—	—	—	65·5	26·2	1837–46
1838–47	62·4	35·2	—	—	—	—	—	—	—	64·4	24·7	1838–47
1839–48	62·3	35·1	—	—	—	—	—	—	—	64·9	28·6	1839–48
1840–49	62·7	35·0	6·5	—	—	—	—	—	—	62·9	27·7	1840–49
1841–50	62·5	35·3	6·6	—	—	28·1	—	—	—	64·8	23·1	1841–50
1842–51	61·8	34·9	6·3	—	—	28·3	—	—	—	64·9	23·7	1842–51
1843–52	61·7	34·7	6·6	—	—	28·4	—	—	—	65·3	19·8	1843–52
1844–53	61·1	34·4	6·7	—	—	29·3	—	—	—	65·7	21·0	1844–53
1845–54	61·6	34·5	7·3	—	—	29·0	—	—	—	67·7	24·3	1845–54
1846–55	62·1	35·2	7·7	—	—	28·8	—	—	—	67·5	24·4	1846–55
1847–56	62·0	35·2	7·7	—	—	28·7	—	—	—	68·3	26·4	1847–56
1848–57	62·0	35·2	8·0	—	—	28·7	—	—	—	71·6	30·5	1848–57
1849–58	62·2	35·3	8·6	—	—	28·8	—	—	—	73·1	28·2	1849–58
1850–59	62·3	35·4	9·4	—	—	28·7	—	30·1	—	74·0	25·2	1850–59
1851–60	62·6	35·3	9·2	—	—	28·3	—	30·2	—	72·1	26·2	1851–60
1852–61	63·0	35·4	9·3	—	—	28·2	—	30·6	—	72·6	26·7	1852–61
1853–62	62·7	35·5	8·9	—	—	28·0	*31·9*	30·3	—	73·1	32·2	1853–62
1854–63	62·9	36·1	8·7	—	—	27·7	*32·2*	30·7	—	73·0	28·5	1854–63

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE VI(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1855–64	63·0	36·3	8·3	—	—	27·9	*31·9*	31·3	—	70·7	24·1	1855–64
1856–65	62·8	36·2	8·3	—	—	27·8	*31·9*	31·9	—	70·4	23·8	1856–65
1857–66	62·8	36·3	8·4	—	—	27·8	*31·6*	32·6	—	69·9	23·8	1857–66
1858–67	62·2	36·4	8·6	—	—	27·6	*31·6*	32·3	—	68·1	21·4	1858–67
1859–68	62·7	36·9	8·8	—	—	27·5	*31·3*	32·5	—	65·4	21·2	1859–68
1860–69	62·8	36·6	8·4	—	33·3	27·4	*31·1*	32·6	*34·9*	66·0	23·7	1860–69
1861–70	62·8	36·7	9·2	—	33·0	27·4	*31·5*	32·3	*35·6*	67·3	24·2	1861–70
1862–71	62·7	36·7	9·0	—	33·0	27·3	*31·4*	31·9	*35·4*	66·8	23·8	1862–71
1863–72	62·4	36·3	9·4	—	33·3	27·5	*31·4*	32·0	*35·2*	66·0	19·3	1863–72
1864–73	62·0	36·1	9·7	—	32·9	27·3	*31·0*	32·0	34·9	66·1	23·5	1864–73
1865–74	62·1	36·0	9·7	—	32·8	27·1	*30·9*	31·7	33·5	66·8	27·9	1865–74
1866–75	62·0	35·9	9·9	—	32·9	27·2	*30·8*	31·7	33·9	67·1	26·0	1866–75
1867–76	62·3	35·9	10·0	—	32·7	27·3	*30·5*	31·7	34·0	66·4	22·5	1867–76
1868–77	62·7	35·8	9·7	—	32·5	27·4	*30·3*	31·9	34·8	67·2	23·5	1868–77
1869–78	62·8	35·1	9·0	—	32·5	27·3	*30·2*	31·6	34·8	66·7	22·8	1869–78
1870–79	61·9	35·1	8·9	*27·9*	32·4	27·5	*30·5*	31·4	33·8	66·8	24·2	1870–79
1871–80	61·2	34·8	8·5	*28·1*	33·2	27·5	*30·3*	31·6	32·7	65·1	25·2	1871–80
1872–81	61·3	34·7	8·5	*28·2*	33·2	27·6	*30·6*	32·0	33·4	62·8	20·5	1872–81
1873–82	61·8	34·8	8·1	*28·0*	32·9	27·4	*30·6*	31·8	33·9	66·0	26·8	1873–82
1874–83	61·9	34·4	7·9	*27·4*	33·4	27·5	*30·9*	31·8	34·9	66·2	25·8	1874–83
1875–84	61·1	33·8	7·1	*27·7*	33·3	27·5	*31·3*	32·1	35·0	67·0	26·4	1875–84
1876–85	61·5	33·6	6·6	*27·6*	33·6	27·4	*31·5*	32·1	35·3	66·7	24·6	1876–85
1877–86	61·1	33·4	6·3	*28·2*	34·1	27·2	*31·7*	32·0	34·9	67·5	27·8	1877–86
1878–87	60·9	33·4	6·5	*29·0*	34·4	27·0	*31·8*	31·6	33·3	67·0	23·0	1878–87
1879–88	59·5	33·3	6·4	*29·1*	34·7	26·9	*32·0*	31·8	33·4	67·7	25·8	1879–88
1880–89	59·3	33·1	6·5	*29·3*	34·7	26·8	*31·9*	32·2	34·2	70·3	25·8	1880–89
1881–90	60·0	33·3	6·3	*29·2*	34·5	26·8	*31·6*	32·2	35·1	70·3	27·3	1881–90
1882–91	60·2	33·2	6·1	*29·1*	34·5	26·7	*31·4*	32·2	35·0	72·4	31·5	1882–91
1883–92	60·5	33·4	6·2	*29·7*	34·6	26·8	*31·1*	32·6	35·0	69·3	25·5	1883–92
1884–93	60·6	33·6	6·3	*30·1*	34·3	27·1	*30·7*	32·4	34·5	68·5	24·3	1884–93
1885–94	60·9	34·1	6·9	*30·0*	34·3	27·1	*30·2*	32·1	34·4	66·5	17·7	1885–94
1886–95	60·7	33·9	7·0	*30·3*	34·0	27·1	*29·7*	31·9	33·6	66·5	22·2	1886–95
1887–96	61·0	34·0	6·9	*30·0*	33·6	27·3	*29·3*	31·3	32·7	65·9	18·5	1887–96
1888–97	61·4	33·9	6·7	*30·1*	33·2	27·7	*28·8*	31·4	33·3	63·4	20·8	1888–97
1889–98	62·6	34·3	6·9	*30·0*	32·8	27·8	*28·6*	31·3	33·3	64·9	18·7	1889–98

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE VI(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure: in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean: Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1890–99	63·5	34·6	6·8	*29·3*	32·6	27·9	*28·1*	31·0	33·6	61·4	15·3	1890–99
1891–1900	62·7	34·3	6·7	*29·1*	32·3	27·9	*28·2*	30·8	32·3	62·1	11·9	1891–1900
1892–1901	62·8	34·4	7·1	*29·2*	32·4	27·9	*28·3*	30·9	32·0	60·8	8·9	1892–1901
1893–1902	62·1	34·2	7·4	*29·1*	32·6	27·8	*28·5*	30·6	32·0	60·2	9·6	1893–1902
1894–1903	61·6	33·9	7·6	*29·9*	32·8	27·4	*28·8*	30·6	31·5	60·6	7·4	1894–1903
1895–1904	61·6	33·7	7·9	*29·7*	32·5	27·3	*28·9*	30·9	32·4	62·1	14·1	1895–1904
1896–1905	61·5	33·7	8·2	*29·8*	32·5	27·4	*29·4*	30·8	32·6	61·1	10·6	1896–1905
1897–1906	61·3	33·6	8·4	*30·1*	32·7	27·3	*29·7*	31·0	32·6	60·1	9·8	1897–1906
1898–1907	60·5	33·6	8·6	*30·5*	32·6	27·1	*30·4*	30·9	33·1	64·1	10·0	1898–1907
1899–1908	59·7	33·3	8·8	*31·3*	32·4	27·2	*30·5*	31·2	33·1	62·6	7·9	1899–1908
1900–09	59·5	33·1	9·1	*32·2*	33·1	27·1	*31·0*	31·1	32·8	62·8	8·6	1900–09
1901–10	59·5	33·1	9·4	*32·7*	33·0	27·2	*31·1*	30·6	32·0	62·4	9·3	1901–10
1902–11	60·1	33·0	9·4	*32·6*	33·2	27·3	*31·1*	30·1	32·1	63·4	8·3	1902–11
1903–12	60·6	33·1	9·3	*32·5*	33·5	27·2	*31·3*	30·3	32·8	63·8	9·6	1903–12
1904–13	62·3	33·5	9·4	*32·0*	33·1	27·2	*30·5*	30·3	32·8	63·5	11·0	1904–13
1905–14	62·0	33·5	9·5	*31·6*	32·5	27·2	*30·7*	30·0	32·0	61·2	6·4	1905–14
1906–15	61·8	33·8	9·3	*31·6*	32·7	27·2	*29·9*	30·0	32·2	61·5	9·9	1906–15
1907–16	62·7	33·8	9·5	*31·5*	33·1	27·4	*29·4*	30·0	32·4	61·5	12·2	1907–16
1908–17	62·9	33·9	9·3	*31·4*	33·6	27·3	*29·2*	29·5	31·4	59·2	11·8	1908–17
1909–18	62·7	33·9	8·9	*31·1*	34·0	27·2	*29·1*	29·3	31·2	58·9	16·7	1909–18
1910–19	62·8	34·1	9·0	30·8	33·3	27·6	*28·8*	29·4	31·1	59·5	17·3	1910–19
1911–20	63·6	34·2	9·2	30·1	34·1	27·4	*28·9*	29·9	32·4	59·8	19·8	1911–20
1912–21	62·6	33·9	9·2	30·5	34·7	27·2	*28·6*	29·9	32·1	60·9	19·8	1912–21
1913–22	62·4	34·1	9·1	30·6	33·9	27·2	*27·5*	29·5	31·6	61·7	22·3	1913–22
1914–23	61·3	33·7	8·8	30·4	34·0	27·2	*27·5*	29·3	30·9	59·2	18·6	1914–23
1915–24	61·8	33·6	8·6	30·9	35·1	27·3	*27·3*	29·5	31·2	60·5	22·5	1915–24
1916–25	62·5	33·6	8·6	31·2	35·1	27·2	*28·3*	29·4	30·3	61·5	21·2	1916–25
1917–26	62·0	33·7	8·5	31·3	34·6	27·0	*28·7*	29·1	29·9	62·0	19·9	1917–26
1918–27	62·8	33·6	8·5	30·6	33·6	27·0	*28·8*	29·4	30·2	63·3	23·8	1918–27
1919–28	63·6	33·7	8·5	30·5	33·4	27·1	*29·0*	29·2	29·9	63·2	20·2	1919–28
1920–29	64·7	33·4	8·2	30·8	33·8	26·5	*28·9*	29·0	29·1	63·0	17·9	1920–29
1921–30	64·7	33·4	8·0	31·1	32·4	26·7	*29·1*	28·8	28·3	63·4	17·6	1921–30
1922–31	64·5	33·6	8·1	31·2	31·4	26·9	*29·6*	28·7	27·8	63·8	22·1	1922–31
1923–32	65·7	33·6	8·2	31·3	31·8	26·9	*30·4*	28·7	27·9	63·5	21·5	1923–32
1924–33	66·7	33·9	8·4	31·5	32·2	27·2	*30·8*	29·0	29·4	65·2	22·5	1924–33

Values in italics are only reliable if combined in 40-year, or longer, means.

TABLE VI(*a*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1925–34	66·9	34·2	8·7	32·0	32·6	27·2	*30·6*	28·7	28·7	64·9	18·5	1925–34
1926–35	66·8	34·3	8·9	31·7	32·5	27·2	*30·2*	28·6	28·8	64·1	16·3	1926–35
1927–36	66·1	33·9	9·0	31·4	32·4	27·2	*30·4*	28·8	28·8	64·6	19·8	1927–36
1928–37	65·7	34·0	9·0	31·8	33·1	27·3	*30·7*	29·1	29·3	64·4	15·6	1928–37
1929–38	65·7	33·9	9·1	31·6	33·2	27·5	*30·8*	29·5	31·0	65·6	18·7	1929–38
1930–39	64·1	33·9	9·0	31·3	32·8	27·7	*31·3*	29·8	31·0	65·6	23·5	1930–39
1931–40	63·8	34·2	9·3	31·1	33·0	27·7	*31·1*	29·8	31·4	64·9	23·4	1931–40
1932–41	64·4	34·4	9·5	30·7	33·1	28·1	*30·7*	29·8	31·8	63·1	21·7	1932–41
1933–42	63·7	34·6	9·6	30·5	33·3	28·1	*31·2*	30·0	30·9	63·4	21·0	1933–42
1934–43	63·0	34·5	9·7	30·0	32·3	28·0	*31·2*	29·7	29·5	64·6	22·0	1934–43
1935–44	62·4	34·3	9·6	29·0	32·0	28·1	*31·1*	29·9	30·3	65·6	26·4	1935–44
1936–45	62·5	34·3	9·6	28·8	32·1	28·3	*30·9*	30·4	30·2	66·0	28·9	1936–45
1937–46	62·9	34·6	9·7	28·5	32·5	28·5	*30·5*	30·0	30·1	66·0	26·9	1937–46
1938–47	62·8	34·7	10·0	28·5	32·8	28·6	*30·0*	29·8	29·7	65·9	26·2	1938–47
1939–48	62·5	34·7	10·3	28·7	32·9	28·5	*29·9*	29·4	28·2	65·3	24·7	1939–48
1940–49	63·4	34·9	10·3	28·4	33·5	28·7	*29·3*	29·0	28·8	65·2	21·1	1940–49
1941–50	63·2	34·8	10·2	28·6	34·2	28·6	*29·1*	29·3	29·6	65·4	22·7	1941–50
1942–51	63·2	34·9	9·9	28·0	34·2	28·0	*29·0*	29·2	29·7	65·9	21·0	1942–51
1943–52	63·3	35·0	9·9	28·0	34·1	28·1	*28·8*	29·4	30·6	65·9	19·0	1943–52
1944–53	62·7	35·1	10·0	28·1	34·6	28·0	*29·1*	29·4	30·9	65·5	22·3	1944–53
1945–54	63·1	35·2	9·7	28·7	34·3	28·0	*28·9*	29·4	30·8	64·5	21·7	1945–54
1946–55	63·7	35·5	8·7	28·7	34·9	28·2	*29·1*	29·3	32·1	62·9	19·4	1946–55
1947–56	63·5	35·4	8·8	28·6	35·2	27·9	*29·2*	29·6	32·4	63·6	21·5	1947–56
1948–57	63·3	35·4	8·8	28·5	34·7	27·6	29·0	29·7	32·6	63·4	24·9	1948–57
1949–58	62·5	35·2	8·7	28·3	34·4	27·5	29·0	29·5	33·3	63·2	22·0	1949–58
1950–59	62·1	35·4	8·9	28·3	34·5	27·5	29·4	29·7	33·5	63·7	24·5	1950–59
1951–60	62·2	35·6	8·7	28·3	34·6	28·0	29·4	29·2	32·6	64·3	23·3	1951–60
1952–61	62·0	35·3	8·9	28·8	34·8	28·4	29·7	29·4	32·2	62·6	25·4	1952–61
1953–62	61·3	35·0	8·6	28·1	34·8	28·3	29·5	29·3	31·9	62·2	26·7	1953–62
1954–63	61·6	34·9	8·2	27·8	34·9	28·6	29·3	29·1	31·3	62·9	22·4	1954–63

Values in italics are only reliable if combincd in 40-year, or longer, means.

TABLE VI(*b*)—POSITION INDICES IN JULY, POSITIONS EACH JULY

	Sub-polar low, North Atlantic: Average latitude of lowest pressure: in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean: Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°S	°S	°S	°N	°S	°S	°S	°W	°W	
1850	—	—	—	—	—	31	—	—	—	—	—	1850
1851	—	—	—	—	—	29	—	—	—	—	—	1851
1852	—	—	—	—	—	29	—	—	—	—	—	1852
1853	—	—	—	—	—	31	—	—	—	—	—	1853
1854	—	—	—	—	—	27	—	—	—	—	—	1854
1855	—	—	—	—	—	28	—	—	—	—	—	1855
1856	—	—	—	—	—	27	—	—	—	—	—	1856
1857	—	—	—	—	—	29	—	—	—	—	—	1857
1858	—	—	—	—	—	29	—	—	—	—	—	1858
1859	—	—	—	—	—	27	—	32	—	—	—	1859
1860	—	—	—	—	32	27	—	34	—	—	—	1860
1861	—	—	—	—	33	28	—	33	—	—	—	1861
1862	—	—	—	—	32	27	—	30	—	—	—	1862
1863	—	—	—	—	36	28	—	32	—	—	—	1863
1864	—	—	—	—	34	29	—	33	44	—	—	1864
1865	61	36	—	—	31	27	—	32	31	67	32	1865
1866	62	36	—	—	32	27	—	35	40	65	40	1866
1867	59	35	—	—	37	27	—	32	32	62	20	1867
1868	68	42	—	—	33	28	—	32	28	58	17	1868
1869	66	35	—	—	33	26	—	33	37	68	25	1869
1870	64	36	—	—	29	27	—	31	45	77	12	1870
1871	62	35	—	—	33	27	—	29	29	68	42	1871
1872	56	32	—	—	35	29	—	31	31	63	2	1872
1873	59	36	—	—	32	26	—	32	31	68	47	1873
1874	64	36	—	—	33	27	—	30	30	72	42	1874
1875	60	35	—	—	32	28	—	32	35	70	13	1875
1876	65	36	—	—	30	28	—	35	41	58	5	1876
1877	63	33	—	—	35	28	—	34	39	70	30	1877
1878	69	35	—	—	33	27	—	29	29	53	10	1878
1879	57	35	—	—	32	28	—	31	27	69	39	1879

TABLE VI(*b*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1880	57	33	—	—	37	27	—	33	34	60	22	1880
1881	63	34	—	—	33	28	—	33	37	45	5°E	1881
1882	61	33	—	—	32	27	—	29	35	95	65	1882
1883	60	32	—	—	37	27	—	32	41	70	37	1883
1884	56	30	—	—	32	27	—	33	31	80	48	1884
1885	64	33	—	—	35	27	—	32	38	67	5°E	1885
1886	61	35	—	—	35	26	—	34	37	66	37	1886
1887	61	33	—	—	38	26	—	30	23	65	18°E	1887
1888	55	34	—	—	36	26	—	31	30	60	38	1888
1889	55	33	—	—	32	27	—	35	36	95	39	1889
1890	64	35	6	—	35	27	—	33	42	60	37	1890
1891	65	33	5	—	33	27	—	33	36	66	37	1891
1892	64	34	8	—	33	28	—	33	35	64	5	1892
1893	61	35	8	—	34	30	—	30	37	62	25	1893
1894	59	35	7	—	32	27	—	30	30	60	18°E	1894
1895	62	32	6	—	32	27	—	30	31	67	40	1895
1896	64	35	5	—	31	28	—	28	29	60	0	1896
1897	65	32	7	—	34	30	—	31	28	40	5	1897
1898	67	38	9	—	32	27	—	30	31	75	17	1898
1899	64	36	7	—	30	28	—	32	37	60	5	1899
1900	56	33	5	—	32	27	—	31	29	67	3	1900
1901	66	35	9	—	34	27	—	34	33	53	7	1901
1902	57	31	11	—	35	27	—	30	35	58	12	1902
1903	56	32	10	—	36	26	—	30	32	66	3	1903
1904	59	33	10	—	29	26	—	33	39	75	49	1904
1905	61	32	9	—	32	28	—	29	33	57	5	1905
1906	62	34	7	—	33	27	—	30	29	50	8°E	1906
1907	57	32	9	—	33	28	—	30	33	80	7	1907
1908	59	35	11	—	30	28	—	33	31	60	4°E	1908
1909	62	34	10	—	37	27	—	31	34	62	12	1909

TABLE VI(*b*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure: in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean: Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1910	56	33	8	—	31	28	—	26	21	63	10	1910
1911	72	34	9	—	36	28	—	29	34	63	3°E	1911
1912	62	32	10	—	38	26	—	32	42	62	25	1912
1913	73	36	11	—	32	26	—	30	32	63	17	1913
1914	56	34	11	—	23	26	—	30	31	52	3	1914
1915	59	35	7	—	34	28	—	29	35	60	40	1915
1916	71	34	9	—	37	29	—	30	31	50	15	1916
1917	59	33	7	—	38	27	—	25	23	57	3	1917
1918	57	35	7	—	34	27	—	31	29	57	45	1918
1919	63	36	11	—	30	31	—	32	33	68	18	1919
1920	64	33	10	—	39	26	—	31	34	66	35	1920
1921	62	32	9	—	42	26	—	29	31	74	3°E	1921
1922	60	33	9	—	30	26	—	28	37	70	50	1922
1923	62	32	8	—	33	26	—	28	25	38	20°E	1923
1924	61	32	9	—	34	27	—	32	34	65	42	1924
1925	66	35	7	—	34	27	—	28	26	70	27	1925
1926	66	35	8	—	32	27	—	27	27	55	2	1926
1927	67	33	7	—	28	27	—	28	26	70	42	1927
1928	65	35	7	—	32	28	—	29	26	56	9	1928
1929	74	33	8	—	34	25	—	30	25	66	5°E	1929
1930	64	33	8	—	25	28	—	29	26	70	32	1930
1931	60	34	10	—	32	28	—	28	26	78	42	1931
1932	72	33	10	—	34	26	—	28	38	67	44	1932
1933	72	35	10	—	37	29	—	31	40	55	10°E	1933
1934	63	35	12	—	38	27	—	29	27	62	2	1934
1935	65	36	9	—	33	27	—	27	27	62	5	1935
1936	59	32	9	—	31	27	—	29	27	60	37	1936
1937	63	34	7	—	35	28	—	31	31	68	0	1937
1938	65	34	8	—	33	30	—	33	43	68	40	1938
1939	58	33	7	—	30	27	—	33	25	66	43	1939

TABLE VI(*b*)—*continued*

	Sub-polar low, North Atlantic: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, North Atlantic: Average latitude of highest pressure in 60, 50, 40, 30, 20°W	Intertropical trough, Atlantic sector: Average latitude of lowest pressure in 40, 30, 20, 10°W	Subtropical high, South Atlantic: Average latitude of highest pressure in 40, 30, 20, 10, 0°W	Subtropical maximum, Chile: Latitude of highest pressure in 70°W	Monsoon trough, Indian sector: Average latitude of lowest pressure in 50, 60, 70, 80, 90°E	Subtropical high, South Indian Ocean Average latitude of highest pressure in 30, 40, 50, 60, 70°E	Subtropical high, Australia: Average latitude of highest pressure in 120, 130, 140, 150°E	Subtropical high, New Zealand: Average latitude of highest pressure in 150, 160, 170, 180°E	Western North Atlantic trough: Longitude of lowest pressure at 55°N	Eastern North Atlantic ridge: Longitude of highest pressure at 55°N	
	°N	°N	°N	°S	°S	°N	°S	°S	°S	°W	°W	
1940	61	36	11	—	27	28	—	29	30	63	31	1940
1941	66	36	12	—	33	32	—	28	30	60	25	1941
1942	65	35	11	—	36	26	—	30	29	70	37	1942
1943	65	34	11	28	27	28	—	28	26	67	0	1943
1944	57	34	11	26	35	28	—	31	35	72	46	1944
1945	66	35	9	28	34	29	—	32	26	66	30	1945
1946	63	35	10	29	35	29	—	25	26	60	17	1946
1947	62	35	10	29	38	29	—	29	27	67	7°E	1947
1948	62	34	11	30	34	29	32	29	28	62	25	1948
1949	67	35	7	27	36	29	27	29	31	65	7	1949
1950	59	34	10	31	34	27	29	32	38	65	47	1950
1951	66	37	9	23	33	26	28	27	31	65	8	1951
1952	66	36	11	29	35	27	32	32	38	70	17	1952
1953	59	35	12	29	32	27	31	28	29	63	33	1953
1954	61	35	8	32	32	28	25	31	34	62	40	1954
1955	72	38	1°S	28	40	31	30	31	39	50	7	1955
1956	61	34	11	27	38	26	29	28	29	67	38	1956
1957	60	36	10	29	33	26	27	30	29	65	27	1957
1958	54	32	10	27	31	28	32	27	35	60	4°E	1958
1959	63	37	9	27	37	29	31	31	33	70	32	1959
1960	60	35	8	31	35	32	29	27	29	71	35	1960
1961	64	35	11	28	35	30	31	29	27	48	29	1961
1962	59	33	8	23	35	26	30	31	35	66	30	1962
1963	62	34	8	26	33	30	29	26	23	70	10°E	1963

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